NAS 1.14:13/3

VOLUME 13/NUMBER 3
FEBRUARY 8, 1975
ACC. NOS. N75-11892 TO N75-12891

MAR 5 1975

STAR
AN ABSTRACT JOURNAL

Scientific and Technical Aerospace Reports

RECEIVED
MIAMI UNIVERSITY
LIBRARIES
MAR 3 1975
DOCUMENTS DEPARTMENT

PRODUCED BY THE
SCIENTIFIC AND TECHNICAL
INFORMATION
OFFICE

NASA

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

WHAT YOU CAN DO FOR *STAR*

All users of this abstract service are urged to forward reports to be considered for announcement in *STAR*. This will aid NASA in its efforts to provide the fullest possible coverage of all scientific and technical publications that might support aeronautics and space research and development. If you have prepared relevant reports (other than those that you will transmit to NASA, DoD, or AEC through the usual contract or grant reporting channels), please send them to NASA, Scientific and Technical Information Office/KSI, Washington, D.C. 20546, for consideration.

Reprints of journal articles, book chapters, and conference papers are also welcome. These will be considered for announcement in *STAR's* companion journal, *International Aerospace Abstracts*.

You may specify a particular source to be included in a report announcement if you wish; otherwise the report will be placed on public sale at the National Technical Information Service. Copyrighted publications will be announced but not distributed nor sold.

PURCHASE OF *STAR*

The semimonthly issues and the cumulative index issues are available postpaid on subscription and in single copy from the Superintendent of Documents, United States Government Printing Office, Washington, D.C., 20402, United States of America.

Semimonthly issues...

Annual subscription rates: $66.90 domestic; $83.65 foreign. Price per single copy: $2.80 domestic; $3.50 foreign.

Cumulative index issues...

Annual subscription rates: $28.10 domestic; $35.15 foreign. Price per single copy varies according to number of pages.

Domestic subscription rates...

Apply to the United States, Canada, Mexico, and all Central and South American countries, except as noted below.

Foreign subscription rates...

Apply to Argentina, Brazil, French Guiana, Guyana, Surinam, Belize, and all other countries throughout the world.

Payment should be by check, money order, or document coupons, and must accompany order. Remittances from foreign countries should be made by international money order or draft on an American bank, payable to the Superintendent of Documents, or by UNESCO book coupons.

PUBLISHED BY:

UNITED STATES GOVERNMENT
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
SCIENTIFIC AND TECHNICAL INFORMATION OFFICE
Scientific and Technical Aerospace Reports, Volume 13, is prepared by the NASA Scientific and Technical Information Facility operated for the National Aeronautics and Space Administration by Informatics Information Systems Company.

The Administrator of the National Aeronautics and Space Administration has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Agency. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through June 30, 1977.

INTRODUCTION

Scientific and Technical Aerospace Reports (*STAR*) is a major component of a comprehensive National Aeronautics and Space Administration information system covering aeronautics, space, and supporting disciplines. *STAR* is issued on the 8th and 23rd of each month and announces current publications of the following types:

- NASA, NASA contractor, and NASA grantee reports
- Reports issued by other U.S. Government agencies, domestic and foreign institutions, universities, and private firms
- Translations in report form
- NASA FEDD (For Early Domestic Dissemination) documents
- NASA-owned patents and patent applications
- Dissertations and theses

Cumulative index volumes are published semiannually and annually.

Journal, book, and conference literature, cover-to-cover journal translations, and certain foreign dissertations are announced in a companion journal, *International Aerospace Abstracts (IAA)*, available on subscription from the American Institute of Aeronautics and Astronautics, Technical Information Service, 750 Third Avenue, New York, N. Y. 10017.

ON-GOING RESEARCH PROJECTS

By arrangement between NASA and the Smithsonian Science Information Exchange (SSIE), a separate section of information on aerospace-related *On-Going Research Projects* is inserted into each issue of *STAR*. The insert presents titles of active NASA grants and university contracts, summary portions of recently updated *NASA Research and Technology Operating Plans (RTOP's)*, and notices of non-NASA research projects that were funded in the most recent or current fiscal year. The latter are selected by SSIE. The project announcements in the insert are arranged by *STAR* divisions but are otherwise entirely separate from *STAR*. They are not indexed nor machine-searchable by NASA. Current and retrospective searches are available from SSIE, 1730 M Street, N.W., Washington, D.C. 20036.

Subject scope of *STAR*, *IAA*, and *On-Going Research Projects* includes all aspects of aeronautics and space research and development, supporting basic and applied research, and applications. Aerospace aspects of earth resources, energy development, conservation, oceanography, environmental protection, urban transportation, and other topics of high national priority are also covered.

Other NASA publications and information services are described in a booklet, *The NASA Scientific and Technical Information System ... and How to Use It*, available without charge from the NASA Scientific and Technical Information Facility, P. O. Box 33, College Park, Maryland 20740.

CATEGORIES AND CROSS-REFERENCES

STAR is categorized by 10 major subdivisions divided into 74 specific subject categories and one general category/division. These are presented in the Table of Contents. Documents announced in *STAR* are not ordinarily cross-referenced between categories, except for certain conference reports or book translations that have had separate abstracts written for their component papers or chapters. Citations and abstracts of the components follow immediately after those of the parent document. When the subject content of a component differs sufficiently from the general content of the parent, a cross-reference citation also is printed at the end of the category to which it normally would have been assigned if it were independent.

AVAILABILITIES

One or more sources from which a document announced in *STAR* is available to the public is ordinarily given on the last line of the citation. The most commonly indicated sources and their acronyms or abbreviations are listed below. If the publication is available from a source other than those listed, the publisher and his address will be displayed on the availability line or in combination with the corporate source line.

Avail: NTIS. Sold by the National Technical Information Service to U.S. customers at the price shown in the citation following the letters HC (hard, paper, or facsimile copy). Customers outside the U.S. should add $2.50 per copy for handling and postage charges to the price shown. (Prices shown in earlier *STAR* volumes, 1962-1974, have been superseded but may be calculated from the number of pages shown in the citation. The price schedule by page count was given in the last *STAR* issue of 1974 or may be obtained from NTIS.)

Microfiche[1] is available at a standard price of $2.25 (plus $1.50 for non-U.S. customers) regardless of age for those accessions followed by a "#" symbol. Accession numbers followed by a "+" sign are not available as microfiche because of size or reproducibility.

Initially distributed microfiche under the NTIS SRIM (Selected Research on Microfiche) is available at greatly reduced unit prices. For this service and for information concerning subscription to NASA printed reports, consult the NTIS Subscription Unit.

NOTE ON ORDERING DOCUMENTS: When ordering NASA publications (those followed by the "*"symbol), use the N accession number.

NASA patent applications (only the specifications are offered) should be ordered by the US-Patent-Appl-SN number.

Non-NASA publications (no asterisk) should be ordered by the AD, PB, or other *report* number shown on the last line of the citation, not by the N accession number. It is also advisable to cite the title and other bibliographic identification.

Avail: SOD (or GPO). Sold by the Superintendent of Documents, U.S. Government Printing Office, in hard copy. The current price and order number are given following the availability line. (NTIS will fill microfiche requests, at the standard $2.25 price, for those documents identified by a # symbol.)

(1) A microfiche is a transparent sheet of film 105 by 148 mm in size, containing as many as 60 to 98 pages of information reduced to micro images (Not to exceed 24: 1 reduction).

Avail: NASA Public Document Rooms. Documents so indicated may be examined at or purchased from the National Aeronautics and Space Administration, Public Documents Room (Room 126), 600 Independence Ave., S.W., Washington, D.C. 10546, or public document rooms located at each of the NASA research centers, the NASA Space Technology Laboratories, and the NASA Pasadena Office at the Jet Propulsion Laboratory.

Avail: AEC Depository Libraries. Organizations in U.S. cities and abroad that maintain collections of U.S. Atomic Energy Commission reports, usually in microfiche form, are listed in *Nuclear Science Abstracts*. Services available from the USAEC and its depositories are described in a booklet, *Science Information Available from the Atomic Energy Commission* (TID-4550), which may be obtained without charge from the USAEC Technical Information Center.

Avail: Univ. Microfilms. Documents so indicated are dissertations selected from *Dissertation Abstracts* and are sold by University Microfilms as xerographic copy (HC) at $10.00 each and microfilm at $4.00 each regardless of the length of the manuscript. Handling and shipping charges are additional. All requests should cite the author and the Order Number as they appear in the citation.

Avail: USGS. Originals of many reports from the U.S. Geological Survey, which may contain color illustrations, or otherwise may not have the quality of illustrations preserved in the microfiche or facsimile reproduction, may be examined by the public at the libraries of the USGS field offices whose addresses are listed in this Introduction. The libraries may be queried concerning the availability of specific documents and the possible utilization of local copying services, such as color reproduction).

Avail: HMSO. Publications of Her Majesty's Stationery Office are sold in the U.S. by Pendragon House, Inc. (PHI), Redwood City, California. The U.S. price (including a service and mailing charge) is given, or a conversion table may be obtained from PHI.

Avail: BLL (formerly NLL): British Library Lending Division, Boston Spa, Wetherby, Yorkshire, England. Photocopies available from this organization at the price shown. (If none is given, inquiry should be addressed to the BLL.)

Avail: ZLDI. Sold by the Zentralstelle für Luftfahrtdokumentation und -Information, Munich, Federal Republic of Germany, at the price shown in deutschmarks (DM).

Avail: Issuing Activity, or Corporate Author, or no indication of availability. Inquiries as to the availability of these documents should be addressed to the organization shown in the citation as the corporate author of the document.

Avail: U.S. Patent Office. Sold by Commissioner of Patents, U.S. Patent Office, at the standard price of 50 cents each, postage free. (See discussion of patents and patent applications below.)

REPORTS AVAILABLE FOR EARLY DOMESTIC DISSEMINATION (FEDD)

NASA has initiated a program under which its technology having significant commercial potential will be disseminated to domestic organizations prior to its general publication. This program implements NASA's mission set forth in the Space Act to preserve the role of the United States as a leader in aeronautical and space science and technology. One of the mechanisms for acquainting domestic organizations with this early-access technology is through publication in *STAR*. The reported technology is identified by the subtitle "An Early Domestic Dissemination Report" in the *STAR* citation, and in addition, is referenced under the entry "Proj. FEDD" in the Contract Number Index. Interested domestic organizations may purchase FEDD reports from any of the following Regional Dissemination Centers:

Aerospace Research Applications
Center (ARAC)(FEDD)
Indiana University
400 E. 7th Street
Bloomington, Indiana 47401

Knowledge Availability Systems
Center (KASC)(FEDD)
University of Pittsburgh
Pittsburgh, Pennsylvania 15260

New England Research Application
Center (NERAC)(FEDD)
Mansfield Professional Park
Box U-41N
The University of Connecticut
Storrs, Connecticut 06268

North Carolina Science and Technology
Research Center (NC/STRC)(FEDD)
P.O. Box 12235
Research Triangle Park,
North Carolina 27709

Technology Application Center
(TAC)(FEDD)
The University of New Mexico
Albuquerque, New Mexico 87106

Western Research Application
Center (WESRAC)(FEDD)
University of Southern California
809 West 34th Street
Los Angeles, California 90007

Queries concerning FEDD program matters other than document orders should be addressed to:

Assistant Administrator for Industry Affairs
and Technology Utilization (Code K)
National Aeronautics and Space Administration
Washington, D.C. 10546

NASA PATENTS AND PATENT APPLICATIONS

Patents and patent applications owned by NASA are announced in *STAR* under appropriate subject categories and are referenced in the *STAR* indexes. In the Report/Accession Number Index, patents are indexed by the NASA Case Number (which appears in lieu of the report number in other indexes), the U.S. Patent Number, the U.S. Patent Application Serial Number, and the U.S. Patent Class. Patent applications for which patents have not yet been issued are indexed by the NASA Case Number and the U.S. Patent Application Serial Number.

NASA *patent application specifications* are sold by the National Technical Information Service at the price shown in the citation. Microfiche are sold at the established unit price of $2.25. The US-Patent-Appl-SN- number should be used in ordering either paper copy or microfiche from NTIS. Printed copies of *patents* (which are not microfiched) are available for purchase at 50 cents per copy from:

Commissioner of Patents
U.S. Patent Office
Washington, D.C. 20231

When ordering patents, the U.S. Patent Number should be used, and payment must be remitted in advance, preferably by money order or check payable to the Commissioner of Patents. Prepaid purchase coupons for ordering are also available from the Patent Office. The patents and patent applications announced in *STAR* are owned by NASA and are available for royalty-free licensing. Requests for licensing terms and further information should be addressed to:

Assistant General Counsel for Patent Matters/Code GP-1
National Aeronautics and Space Administration
Washington, D.C. 20546

ELIGIBILITY AND REGISTRATION FOR NASA INFORMATION PRODUCTS AND SERVICES

A variety of services, in addition to the distribution of NASA scientific and technical reports and of *STAR* and its cumulative indexes, is available to organizations of the following types that have registered with NASA to receive specific services or products:

1. NASA offices, research centers, contractors, subcontractors, grantees, and consultants;
2. Other U.S. Government agencies and their contractors;
3. Libraries in the United States that have arrangements with NASA to maintain collections of NASA documents for public reference;
4. Other organizations in the United States having a need for NASA documents in work related to aeronautics and space research;
5. Organizations abroad that have established reciprocal document exchange arrangements with NASA.

Only the central service points or central points of document acquisition and control within qualified organizations are eligible to register for NASA products and services. Domestic organizations that may be eligible to receive various classes of NASA publications and services should address their requests for registration or for further information to:

NASA Scientific and Technical Information Facility
Attn.: Registration Activity
P.O. Box 33
College Park, MD. 20740

Organizations abroad should direct requests to the same address, but to the attention of: Foreign Exchange and Acquisitions Branch.

ADDRESSES OF ORGANIZATIONS

American Institute of Aeronautics
and Astronautics
Technical Information Service
750 Third Ave.
New York, N.Y. 10017

British Library Lending Division,
Boston Spa, Wetherby, Yorkshire,
England

Commissioner of Patents
U.S. Patent Office
Washington, D.C. 20231

ESRO/ELDO Space Documentation Service
European Space Research Organization
114, av. Charles de Gaulle
92-Neuilly-sur-Seine, France

Her Majesty's Stationery Office
P.O. Box 569, S.E. 1
London, England

NASA Scientific and Technical Information
Facility
P.O. Box 33
College Park, Maryland 20740

National Aeronautics and Space
Administration
Scientific and Technical Information
Office (KSI)
Washington, D.C. 20546

National Technical Information Service
Springfield, Virginia 22161

Pendragon House, Inc.
899 Broadway Avenue
Redwood City, California 94063

Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

University Microfilms
A Xerox Company
300 North Zeeb Road
Ann Arbor, Michigan 48106

University Microfilms, Ltd.
Tylers Green
London, England

U.S. Atomic Energy Commission
Technical Information Center
P.O. Box 62
Oak Ridge, Tennessee 37830

U.S. Geological Survey
1033 General Services Administration Bldg.
Washington, D.C. 20242

U.S. Geological Survey
601 E. Cedar Avenue
Flagstaff, Arizona 86002

U.S. Geological Survey
345 Middlefield Road
Menlo Park, California 94025

U.S. Geological Survey
Bldg. 25, Denver Federal Center
Denver, Colorado 80225

Zentralstelle für Luftfahrtdoku-
mentation und -Information
8 München 86
Postfach 880
Federal Republic of Germany

VOLUME 13 NUMBER 3 / FEBRUARY 8, 1975

TABLE OF CONTENTS

AERONAUTICS

Includes aeronautics (general); aerodynamics; air transportation and safety; aircraft communications and navigation; aircraft design, testing and performance; aircraft instrumentation; aircraft propulsion and power; aircraft stability and control; and research and support facilities (air).

For related information see also *Astronautics*.

01 AERONAUTICS (GENERAL) N.A.

02 AERODYNAMICS 247

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer*.

03 AIR TRANSPORTATION AND SAFETY 249

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation*.

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION 250

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command and Tracking* and *32 Communications*.

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE 252

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics*.

06 AIRCRAFT INSTRUMENTATION 257

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography*.

07 AIRCRAFT PROPULSION AND POWER 257

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion*.

08 AIRCRAFT STABILITY AND CONTROL N.A.

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

09 RESEARCH AND SUPPORT FACILITIES (AIR) 261

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space)*.

ASTRONAUTICS

Includes astronautics (general); astrodynamics; ground support systems and facilities (space); launch vehicles and space vehicles; space transportation; spacecraft communications, command and tracking; spacecraft design, testing and performance; spacecraft instrumentation; and spacecraft propulsion and power.

For related information see also *Aeronautics*.

12 ASTRONAUTICS (GENERAL) 263

For extraterrestrial exploration see *91 Lunar and Planetary Exploration*.

13 ASTRODYNAMICS 264

Includes powered and free-flight trajectories; and orbit and launching dynamics.

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE) N.A.

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research and Support Facilities (Air)*.

15 LAUNCH VEHICLES AND SPACE VEHICLES 264

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

16 SPACE TRANSPORTATION N.A.

Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation*.

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING 265

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications*.

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE 265

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support*. For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics*.

19 SPACECRAFT INSTRUMENTATION N.A.
For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography*.

20 SPACECRAFT PROPULSION AND POWER 269
Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.
For related information see also *07 Aircraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion*.

CHEMISTRY AND MATERIALS

Includes chemistry and materials (general); composite materials; inorganic and physical chemistry; metallic materials; nonmetallic materials; and propellants and fuels.

23 CHEMISTRY AND MATERIALS (GENERAL) 271
Includes biochemistry and organic chemistry.

24 COMPOSITE MATERIALS 272
Includes laminates.

25 INORGANIC AND PHYSICAL CHEMISTRY 273
Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.
For related information see also *77 Thermodynamics and Statistical Physics*.

26 METALLIC MATERIALS 276
Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

27 NONMETALLIC MATERIALS 280
Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

28 PROPELLANTS AND FUELS 281
Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.
For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion*.

ENGINEERING

Includes engineering (general); communications; electronics and electrical engineering; fluid mechanics and heat transfer; instrumentation and photography; lasers and masers; mechanical engineering; quality assurance and reliability; and structural mechanics.
For related information see also *Physics*.

31 ENGINEERING (GENERAL) 282
Includes vacuum technology; control engineering; display engineering; and cryogenics.

32 COMMUNICATIONS 283
Includes land and global communications; communications theory; and optical communications.
For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking*.

33 ELECTRONICS AND ELECTRICAL ENGINEERING 286
Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.
For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics*.

34 FLUID MECHANICS AND HEAT TRANSFER 290
Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.
For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics*.

35 INSTRUMENTATION AND PHOTOGRAPHY 296
Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.
For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation* and *19 Spacecraft Instrumentation*.

36 LASERS AND MASERS 300
Includes parametric amplifiers.

37 MECHANICAL ENGINEERING 304
Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

38 QUALITY ASSURANCE AND RELIABILITY 306
Includes product sampling procedures and techniques; and quality control.

39 STRUCTURAL MECHANICS 307
Includes structural element design and weight analysis; fatigue; and thermal stress.
For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance*.

GEOSCIENCES

Includes geosciences (general); earth resources; energy production and conversion; environment pollution; geophysics; meteorology and climatology; and oceanography.
For related information see also *Space Sciences*.

42 GEOSCIENCES (GENERAL) 311

43 EARTH RESOURCES 312
Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.
For instrumentation see *35 Instrumentation and Photography*.

44 ENERGY PRODUCTION AND CONVERSION 316
Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.
For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation*.

45 ENVIRONMENT POLLUTION 319
Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

46 GEOPHYSICS 320
Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.
For space radiation see *93 Space Radiation*.

47 METEOROLOGY AND CLIMATOLOGY 323
Includes weather forecasting and modification.

48 OCEANOGRAPHY 329
Includes biological, dynamic and physical oceanography; and marine resources.

LIFE SCIENCES

Includes life sciences (general); aerospace medicine; behavioral sciences; man/system technology and life support; and planetary biology.

51 LIFE SCIENCES (GENERAL) 330
Includes genetics.

52 AEROSPACE MEDICINE 332
Includes physiological factors; biological effects of radiation; and weightlessness.

53 BEHAVIORAL SCIENCES 336
Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT 340
Includes human engineering; biotechnology; and space suits and protective clothing.

55 PLANETARY BIOLOGY 341
Includes exobiology; and extraterrestrial life.

MATHEMATICAL AND COMPUTER SCIENCES

Includes mathematical and computer sciences (general); computer operations and hardware; computer programming and software; computer systems; cybernetics; numerical analysis; statistics and probability; systems analysis; and theoretical mathematics.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL) N.A.

60 COMPUTER OPERATIONS AND HARDWARE 341
Includes computer graphics and data processing.
For components see *33 Electronics and Electrical Engineering*.

61 COMPUTER PROGRAMMING AND SOFTWARE 342
Includes computer programs, routines, and algorithms.

62 COMPUTER SYSTEMS 344
Includes computer networks.

63 CYBERNETICS 346
Includes feedback and control theory.
For related information see also *54 Man/System Technology and Life Support*.

64 NUMERICAL ANALYSIS 347
Includes iteration, difference equations, and numerical approximation.

65 STATISTICS AND PROBABILITY 348
Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

66 SYSTEMS ANALYSIS N.A.
Includes mathematical modeling; network analysis; and operations research.

67 THEORETICAL MATHEMATICS 349
Includes topology and number theory.

PHYSICS

Includes physics (general); acoustics; atomic and molecular physics; nuclear and high-energy physics; optics; plasma physics; solid-state physics; and thermodynamics and statistical physics.
For related information see also *Engineering*.

70 PHYSICS (GENERAL) 349
For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar Physics*.

71 ACOUSTICS N.A.
Includes sound generation, transmission, and attenuation.
For noise pollution see *45 Environment Pollution.*

72 ATOMIC AND MOLECULAR PHYSICS 352
Includes atomic structure and molecular spectra.

73 NUCLEAR AND HIGH-ENERGY PHYSICS 352
Includes elementary and nuclear particles; and reactor theory.
For space radiation see *93 Space Radiation.*

74 OPTICS 354
Includes light phenomena.

75 PLASMA PHYSICS 359
Includes magnetohydrodynamics and plasma fusion.
For ionospheric plasmas see *46 Geophysics.* For space plasmas see *90 Astrophysics.*

76 SOLID-STATE PHYSICS 363
Includes superconductivity.
For related information see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

77 THERMODYNAMICS AND STATISTICAL PHYSICS 365
Includes quantum mechanics; and Bose and Fermi statistics.
For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

SOCIAL SCIENCES

Includes social sciences (general); administration and management; documentation and information science; economics and cost analysis; law and political science; and urban technology and transportation.

80 SOCIAL SCIENCES (GENERAL) N.A.
Includes educational matters.

81 ADMINISTRATION AND MANAGEMENT 365
Includes management planning and research.

82 DOCUMENTATION AND INFORMATION SCIENCE 367
Includes information storage and retrieval technology; micrography; and library science.
For computer documentation see *61 Computer Programming and Software.*

83 ECONOMICS AND COST ANALYSIS 368
Includes cost effectiveness studies.

84 LAW AND POLITICAL SCIENCE 368
Includes space law; international law; international cooperation; and patent policy.

85 URBAN TECHNOLOGY AND TRANSPORTATION 368
Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.
For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

SPACE SCIENCES

Includes space sciences (general); astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radiation.
For related information see also *Geosciences.*

88 SPACE SCIENCES (GENERAL) N.A.

89 ASTRONOMY 369
Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

90 ASTROPHYSICS 370
Includes cosmology; and interstellar and interplanetary gases and dust.

91 LUNAR AND PLANETARY EXPLORATION 372
Includes planetology; and manned and unmanned flights.
For spacecraft design see *18 Spacecraft Design, Testing and Performance.* For space stations see *15 Launch Vehicles and Space Vehicles.*

92 SOLAR PHYSICS 372
Includes solar activity, solar flares, solar radiation and sunspots.

93 SPACE RADIATION 373
Includes cosmic radiation; and inner and outer earth's radiation belts.
For biological effects of radiation see *52 Aerospace Medicine.* For theory see *73 Nuclear and High-Energy Physics.*

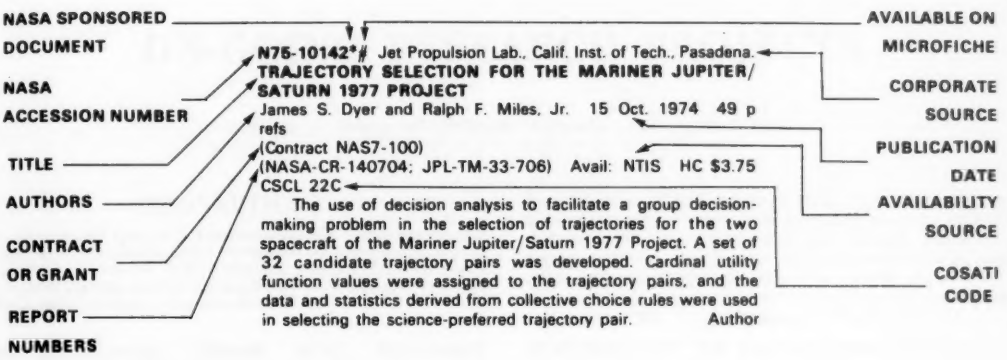
GENERAL

99 GENERAL 373

Note: N.A. means that no abstracts were assigned to this category for this issue.

SUBJECT INDEX I-1
PERSONAL AUTHOR INDEX I-45
CORPORATE SOURCE INDEX I-51
CONTRACT NUMBER INDEX I-63
REPORT/ACCESSION NUMBER INDEX I-67

TYPICAL CITATION AND ABSTRACT


NASA SPONSORED DOCUMENT
NASA ACCESSION NUMBER
TITLE
AUTHORS
CONTRACT OR GRANT
REPORT NUMBERS
AVAILABLE ON MICROFICHE
CORPORATE SOURCE
PUBLICATION DATE
AVAILABILITY SOURCE
COSATI CODE
N75-10142*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
TRAJECTORY SELECTION FOR THE MARINER JUPITER/ SATURN 1977 PROJECT
James S. Dyer and Ralph F. Miles, Jr. 15 Oct. 1974 49 p refs
(Contract NAS7-100)
(NASA-CR-140704; JPL-TM-33-706) Avail: NTIS HC $3.75
CSCL 22C
The use of decision analysis to facilitate a group decision-making problem in the selection of trajectories for the two spacecraft of the Mariner Jupiter/Saturn 1977 Project. A set of 32 candidate trajectory pairs was developed. Cardinal utility function values were assigned to the trajectory pairs, and the data and statistics derived from collective choice rules were used in selecting the science-preferred trajectory pair. Author

ON-GOING RESEARCH PROJECTS

This is a listing of research projects - not publications

AERONAUTICS

Includes Aeronautics (general); Aerodynamics; Air Transportation and Safety; Aircraft Communications and Navigation; Aircraft Design, Testing, and Performance; Aircraft Instrumentation; Aircraft Propulsion and Power: Aircraft Stability and Control; and Research And Support Facilities (air). For Related Information See Also Astronautics.

1.0001, HELICOPTER TROOP SEAT RESTRAINT SYSTEM DESIGN CRITERIA EVALUATION
S. DESJARDINS, Dynamic Science Corporation, *Phoenix, Arizona* 85027 (DAAJ02-73-C-0077)

The objective is- (1) to analytically and experimentally evaluate the practicality, operational suitability, and crashworthiness of the troop restraint system design concepts generated under contract DAAJ02- 72-C-0077- and (2) to update a proposed draft military specification, 'Restraint System, Aircraft Troop/Passenger', for subsequent coordination and publication. This effort is a part of the Army's crash survivability program to develop design criteria and hardware to minimize injuries during aircraft crashes.

The two restraint system concepts designed during DAA402-72-C- 0077 shall be analyzed relative to crashworthiness, practicality, and operatinal suitabilty. Commercially available restraint system components will be investigated and detail design of the two concepts will be performed. Static test articles will be fabricated and tested per the draft military specification. Based on test data analysis the two designs will be refined and the proposed draft military specification updated.

Supporting agency address information: AVCOM Eustis Directorate, US Army Air Mobility Research and Development Laboratory, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

1.0002, IMPACT OF TURBINE MODULATION ON VARIABLE CYCLE ENGINE PERFORMANCE
R. DAVENPORT, Garrett Corporation, *Phoenix, Arizona* 85034 (F33615-71-C-1625)

To design, fabricate, and demonstrate a variable-cycle turbofan engine in which production-type hardware is used and to demonstrate specifically the effect of turbine modulation on the variable-cycle turbofan engine at sea-level static conditions.

This program will use a Garrett TFE731 production engine modified to incorporate variable compressor geometry and variable turbine geometry technology from another Garrett TSCP700-4 two spool APU production unit. The program consists of four phases- phase I includes (a) - the aerodynamic and mechanical design of the variable geometry components for the L.P. Compressor and L.P. Turbine, (b) - the design of the variable-geometry L.P. Compressor rig for aerodynamic evaluation, and (c) - the aerothermodynamic analysis of engine performance with the variable-geometry components. Phase II includes fabrication of variable geometry hardware for compressor rig test and the hardware required to incorporate into a TFE731 test engine for sea level testing. L.P. Compressor rig testing will be conducted in order to establish the optimum variable n1 settings that will minimize inlet airflow at approximately 70 percent speed without imposing severe efficiency losses. Phase III - the variable geometry components will be assembled into a Garrett model TFE731 turbofan engine which will be operated at sea level static conditions. Performance testing will include a minimum of 4 different LPC IGV and 1st stage stator vane angle settings. Performance testing will also include engine operation with at least 5 different LPT inlet nozzle vane-angle settings. Phase IV engine testing will be conducted at simulated altitude and subsonic/supersonic flight velocities in an altitude test cell.

Supporting agency address information: AF Aero-Propulsion Laboratory TBC, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0003, ADVANCED AUXILIARY POWER UNIT DEMONSTRATOR
D. SWENSKI, Garrett Corporation, *Phoenix, Arizona* 85034 (F33615-72-C-1936)

The primary objective of the program is to convert the auxiliary power unit (APU) portion of the Auxiliary Power Unit System, Contract F33615-69-C-1100, to an all shaft horsepower configuration by redesigning the compressor section. The secondary objective of the program is to reduce the starting power of the APU.

The program will span a 18 month period including preparation of the final report. The axial and centrifugal stages of the compressor will be redesigned to achieve compatibility with each other and the developed hot end components. The new compressor will be fabricated and installed in the aircraft APU. The performance of the unit will be measured.

Supporting agency address information: AF Aero-Propulsion Laboratory POP, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0004, HELICOPTER TROOP RESTRAINT SYSTEM DYNAMIC TESTING AND EVALUATION
S. DESJARDINS, Ultrasystems Incorporated, *Phoenix, Arizona* 85027 (DAAJ02-74-C-0034)

(1) Fabricate, dynamically test, and evaluate the two troop restraint systems previously deisgned and statically tested under Contract DAAJ02-73-C-0077, and (2) recommend modifications to the proposed draft general military specification entitled MIL-S-XXXX(AV), 'Restraint System, Aircraft Troop/Passenger,' and USAAMRDL TR 71-22, 'Crash Survival Design Guide.'

This effort will be performed in three (3) tasks- task I, restraint system dynamic testing- task II, fabrication and delivery of type II restraint systems- and task III, design criteria finalization.

Supporting agency address information: AVCOM Eustis Directorate, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

1.0005, RESEARCH STUDIES ON BEHAVIOR OF STABILIZED SOILS UNDER REPEATED LOADINGS
J.K. MITCHELL, Univ. of California, School of Engineering, *Berkeley, California* 94720 (DA-22-079-ENG-414)

Objective: Investigate the influence of repetitive loading conditions on the behavior and engineering characteristics of stabilized soils pertinent to the development of design criteria and procedures for military roads and airfields.

Laboratory investigations will consist of the application of repeated loads to stabilized soil specimens by compression and flexural testing. The behavior of stabilized soils under repetitive

loadings will be measured in terms of strength, modulus of elasticity, and fatigue cracking, and the implications of the observed behavior on stabilized- soil design will be examined. Variables to be examined in the study includes soil type, stabilizer type and quantity, soil moisture content, and curing conditions.

Supporting agency address information: OCE Waterways Experiment Station, Vicksburg, Mi. 39180

SUPPORTED BY U.S. Dept. of Defense - Army

1.0006, DYNAMIC LOADS AND STRUCTURAL CRITERIA, ARMY HELICOPTERS
J.F. NEEDHAM, Hughes Aircraft Company, *Culver City, California* 90230 (DAAJ02-74-C-0018)

The purpose of this procurement is to improve structural design criteria by establishing mission profile definitions that are representative of intended helicopter usage and that provide uniform design requirements. Mission profiles will be developed for observation, utility, tactical assault, attack, crane, and transport type helicopters. Major differences between model specifications and utilization will be discussed. The results of this effort will have broad application throughout helicopter design- for this reason, two contracts have been let to accomplish this work- one to a helicopter company and one to a non-helicopter company.

Mission profiles for several types of helicopters will be developed from operational data, original model specifications, and applicable military specifications. Major differences between model specifications and utilization data will be examined and related to the new profiles being developed. Mission profile segments in which high loading, high vibration, and/or high fatigue damage rates occur will be identified.

Supporting agency address information: AVCOM Eustis Directorate, US Army Air Mobility Research and Development Laboratory, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

1.0007, DETERMINATION OF ENVIRONMENTAL EFFECTS ON PARACHUTE DEPLOYMENT TIMES
J.B. SONNER, U.S. Navy, Aerospace Recovery Facil., *El Centro, California* 92243

Provide adequate data to justify increasing the parachute repack interval. Obtain data upon which to base decisions on parachute repack intervals and/or service life of future systems.

The program objective requires prolonged storage of packed parachutes under conditions which will duplicate both the 'ICAO' standard sea level condition, and the climatic extremes defined in MIL- STD-201A as 'hot wet', 'hot dry' and 'cold dry'. A few parachutes will be removed from each stored condition at definite intervals and drop- tested under 'worst case' conditions (zero forward velocity) using a hot air balloon suspended at 800 foot pressure altitude. The data obtained from drop-test of parachutes stored in the 'extreme' conditions will be compared with data obtained from drop-test of similar parachutes which were stored in the 'ICAO' conditions for similar lengths of time. The data will also be subjected to comparative statistical analysis procedures to determine the validity of indicated trends.

Supporting agency address information: Naval Air Systems Command 340B, Washington, D.C. 20361

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0008, INFLUENCE OF SOLID STATE ELECTRICAL DISTRIBUTION ON AIRCRAFT POWER GENERATION
S. DAWSON, Rockwell International Corp., *El Segundo, California* 90246 (F33615-72-C-1759)

The technical objective is to study the impact of the solid state electrical distribution system on the power generation systems and its controls and protective devices.

Phase I will be mathematical modeling culminating in computer analysis plus qualitative studies. This will include two types of generator systems- constant speed drive (CSD) and variable speed constant frequency (VSCF). Three size generator systems will be studied- 60 KVa at 200 volts, Wye connected, 90 KVa at 200 volts, Wye connected, and 150 KVa at 400 volts, Wye connected. Three distribution systems will be- conventional, present solid state, and projected solid state. Phase II will give recommendations for- 1. Generator design change including subtransient, transient, and synchronous reactance. 2. Changes in military standards, including MIL-STD-704 and MIL-E-23001. 3. Solid state devices including ideas on larger breakers, current limiting, and remotely resetable breakers.

Supporting agency address information: AF Aero-Propulsion Laboratory POD, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0009, FAILURE PROGNOSIS OF ROTARY WING AIRCRAFT MECHANICAL COMPONENTS
J. REIS, Northrop Corporation, *Hawthorne, California* 90250 (DAAJ02-72-C-0118)

The objective of this program is to obtain and analyze data on the relationship of specific sensory outputs to a helicopter gearbox's condition and to investigate their applicability on the determination of the remaining useful life of the component.

Conduct mechanical component tests using at least three government- furnished UH-1 series 90 degrees gearboxes, including one high-time gearbox in a known serviceable condition and two gearboxes containing a known incipient failure. One gearbox will contain a gear in incipient failure condition, and a second gearbox with a bearing containing an incipient failure.

Supporting agency address information: AVSCOM Air Mobility R&D Lab, Eustis Directorate, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

1.0010, DIODE BEACON TARGET ENHANCER
D. PARKER, Stanford Research Institute, *Menlo Park, California* 94025 (F30602-72-C-0424)

To develop a low cost diode beacon target enhancement device that can be attached to light aircraft (A/C) to increase their detectability by airport surveillance radars (ASR). Positive track of A/C approaching and departing the terminal area of an airport is maintained by a ground controller via the ASR. This is done by means of skin return, via primary radar, and an IFF transponder return, via secondary radar. Several types of small A/C do not currently carry an IFF transponder set, thusly, skin tracking is the only means of detection. Because of the low radar cross-section of small A/C, it is not always possible for the ASR to develop sufficient skin return necessary for positive tracking. This effort will result in a low cost beacon, $100 or less, which will increase the radar cross section of these aircraft.

The design approach is to combine two concepts to obtain 31 db of signal enhancement by the beacon target device. A retrodirective antenna array will be used to obtain a two way gain of 20 db. An additional 11 db of gain will be obtained by terminating the retrodirective array with a negative resistance reflection type amplifier. End item evaluation will be accomplished via flight test analysis of a small cross section target aircraft skin track return against beacon enhanced returns using the ASR.

Supporting agency address information: Rome Air Development Center DCI, Griffiss AFB, N.Y. 13440

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0011, FLIGHT TECHNIQUES PROGRAM
D.M. LAYTON, U.S. Navy, Postgraduate School, *Monterey, California* 93941

Provide a multi-engine, light, general aviation aircraft which will be instrumented by NPS so as to provide the parameters necessary to perform in-flight data acquisition for laboratory sections of regularly schedules classes in the Department of Aeronautics, Naval Postgraduate School.

A low-time aircraft to be obtained by lease agreement which shall include maintenance, hangering and support. Minimum instrumentation to be installed in a modular form which will permit easy installation and removal. A pilot qualification procedure will be implemented so as to insure only qualified pilots in command. Detailed test plans to be prepared for each flight event.

Supporting agency address information: Naval Air Systems Command 320D, Washington, D.C. 20361

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0012, ANALYSIS AND SYNTHESIS OF STORE SEPARATION PROGRAM PLAN

A.R. MADDOX, U.S. Navy, Weapons Development Dept., *Ridgecrest, California* 93555

To perform appropriate analysis and to coordinate the expected work unit plant submitted in response to this air task.

As coordinator of the store separation program plan, NWC will; (1) initiate and solicit from other activities work unit plans and proposals; (2) perform critical review of proposed work unit plans and proposals to insure that they fit within the air task; (3) coordinate the activities under the air task; and (4) conduct a continuing review of all store separation activity within the Navy, Air Force, Army, NASA and contractors to keep abreast of current technology.

Supporting agency address information: Naval Air Systems Command, Aero. & Struct. Tech. Adminstration (320C), Washington, D.C. 20361

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0013, NAVY VEHICLE DESIGN AND CONSTRUCTION - AIRFOIL OPTIMIZATION BY ADAPTIVE CONTROL OF CAMBER AND THICKNESS

E. LEVINSKY, General Dynamics Corporation, *San Diego, California* 92112 (N00014-74-C-0127)

The objective of this investigation is to demonstrate the feasibility of designing and evaluating advanced airfoil concepts through wind tunnel testing a self-adaptive flexible-surface airfoil model. This technique if successful will overcome existing deficiencies in both analytic and wind tunnel methods for truely optimizing airfoil and wing geometries at high subsonic and transonic flight conditions, or at low speeds with flaps deployed. Other potential applications of this technique include three-dimensional wind tunnel testing, including multi-slot tangential blowing and/or spanwise blowing for boundary layer control, shock control and vortex control.

An airfoil whose camber and thickness distribution can be continuously varied by remotely controlled actuators will be designed, fabricated and calibrated. The actuators inside the airfoil will conformally deform the airfoil shape according to an optimization method which reduces a merit function (i.e., drag) while holding other constraining functions (i.e., lift, pitching moment) constant. In addition, mathematical analyses and computer programming of the optimization algorithm will be performed and a low speed demonstration wind tunnel test conducted for initial verification of concept.

Supporting agency address information: Office of Naval Research 411, Arlington, Va. 22217

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0014, WASS LANDING SYSTEM

S. WEISBROT, Teledyne Incorporated, *San Diego, California* 92120 (F30602-74-C-0254)

The objective of this effort is to experimentally determine the effectiveness of the wavefront analysis of spatial sampling (WASS) to precision approach. Computer simulation studies performed under previous RADC contracts with teledyne micronetics have indicated that using WASS the direct and runway-reflected signals could be separated with one- fifth to one-tenth of the antenna beamwidth. Thus, during this effort the contractor will demonstrate system capability to separate an aircraft beacon and its runway-reflected image to actual touchdown. Successful demonstration will therefore provide an effective means for precision tracking under zero visibility conditions during the critical phases of the final approach. Civilian and military application of WASS will be to precision approach radars located at civilian (FAA) and military (TAC, ADC, SAC) installations.

This program, a nine month effort, consists of two work phases. The first phase entails acquisition of the WASS equipment for testing and second, to conduct preliminary tests at the contractor's plant and collocated runway, to collect data to ascertain equipment and computer program accuracy.

Supporting agency address information: Rome Air Development Center OCD, Griffiss AFB, N.Y. 13440

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0015, HELICOPTER PAYLOAD POSITION SENSORS

R.E. VESQUE, Garrett Corporation, *Torrance, California* 90509 (DAAJ02-73-C-0064)

Safe and efficient handling of externally slung helicopter cargo loads is a primary mission of the CH-54, CH-47, and the future heavy lift helicopters. Results of previous investigations indicate that special systems on equipment to stabilize the load may be necessary to allow the transporting helicopter to fly at maximum cruise speeds without dangerous aerodynamic-induced load motions. The load position sensor is a fundamental component of an active stabilization system. It is the purpose of this program to investigate and evaluate all applicable sensor concepts and to establish a broad technological base for the selection of the best sensor.

An investigation of technology applicable to external load stabilization systems and sensors will be performed. Conceptual approaches will be established and trade-off methodology for alternate concepts will be developed. After determining the best conceptual approach for a sensor, design and qualifications test requirements will be developed.

Supporting agency address information: AVCOM Air Mobility R&D Lab, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

1.0016, ACOUSTIC RADAR

M. BALSER, Xonics Incorporated, *Van Nuys, California* 91406 (F19628-73-C-0201)

AF function - safe operation of aircraft in lower atmosphere. Deficiency - inadequate data on wind structure in boundary layer. Development - design and fabrication of an acoustic wind sensor for measurement of low level winds. How development contributes - will lead to improved low level wind profile description. An acoustical radar device for the indirect sensing and display in real time of the vertical profile of the horizontal wind will be designed and fabricated. Improved measurements over runways where towers cannot be erected will, (1) improve the testing and evaluation of techniques of warm fog dispersal, (2) make safer the landing and takeoff of operational aircraft during periods of strong wind shear, and (3) provide better documentation of shear in the lower boundary layer in the testing of new aerospace vehicles at test ranges.

Supporting agency address information: AF Cambridge Research Laboratories LY, L. G. Hanscom Field, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0017, INEXPENSIVE ANGLE-OF-ATTACK INSTRUMENTATION

R.W. GALLINGTON, U.S. Air Force, Frank J. Seiler Res. Lab., *Colorado Springs, Colorado* 80840

AF function - improve aircraft control in all related AF mission/function areas. Deficiency - not all USAF aircraft instrumented with angle-of-attack indicators, and existing installations are too expensive. Research - develop and demonstrate operational prototype angle-of-attack indicators of improved ruggedness, reliability and economy. How research contributes - an improved angle-of-attack indicator system will permit the more accurate and safer flight of all USAF aircraft and reduce the expense of future angle-of attack systems. Abstract - the objective of this research is to develop and demonstrate an angle-of-attack indicator of superior quality and less cost than those now in existence in the Air Force. Four instruments will be designed using concepts described in invention disclosures documented by the Principal Investigator. The instruments will differ in material composition, dimension, and type of cockpit display. Each instrument will be built, tested and calibrated on a typical aircraft wing section in a subsonic wind tunnel at appropriate dynamic pressures and Reynold's Numbers. The most promising design will be installed on a slightly modified typical aircraft, recalibrated, and evaluated for use in various phases of flight including take-off, climb, cruise, glide, approach, missed approach, and landing.

Supporting agency address information: Frank J. Seiler Research Lab NH, USAF Academy, Colo. 80840

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0018, UNSTEADY SEPARATED FLOW INTERACTION WITH AN AIRFOIL/FLAP COMBINATION
J.D. LANG, U.S. Air Force, Frank J. Seiler Res. Lab., *Colorado Springs, Colorado* 80840

AF function - flight dynamics. Deficiency - insufficient knowledge of the mechanisms of unsteady separated flow/flap interactions in subsonic and transonic flow regimes. Research - experimental investigation of control-surface 'buzz'. Develop theoretical relationships based on analysis of experiments. How research contributes - potential application of results to solving control-surface 'buzz' problems experienced in conventional aircraft, lifting bodies and lifting surfaces. The detailed dynamics of unsteady flow/flap interactions will be investigated experimentally and theoretically. The experiment involves use of a moveable spoiler on an upper airfoil surface to control unsteady separation of flow. Flap pressure measurements will be made for fixed and free flap configurations. The purpose of the unsteady measurements is to gain insight into the mechanisms of unsteady separated flow/flap interactions which at present, are not well understood. These interactions are predominant in the phenomenon of control-surface 'buzz'. Dynamic stall and stall flutter of airfoils and other lifting surfaces involve similar mechanisms which are not well understood at present. Modifications of well-known unsteady flow theories may yield a theory which is capable of relating to the problem of control-surface 'buzz' for both the subsonic and transonic cases. Research objective 4.1, 4.2 and 4.3 apply.

Supporting agency address information: Frank J. Seiler Research Lab NH, USAF Academy, Colo. 80840

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0019, EXPERIMENTAL AND ANALYTICAL INVESTIGATION OF THE CONTROLLABLE TWIST ROTOR CONTROL SYSTEM
A.L. LEMNOIS, Kaman Aerospace Corporation, *Bloomfield, Connecticut* 06002 (DAAJ02-72-C-0092)

The technical objective of the program is to experimentally evaluate the potential aeroelastic and performance benefits of the controllable twist rotor CTR. The CTR is rotor concept which uses torsionally soft blades in conjunction with a mechanical blade root control and aerodynamic blade tip control to produce blade twist control.

The CTR concept will be carefully analyzed and a Fu66 model system will be designed and built. This model, which will be approximately the size of a CH-34 rotor system will be tested on the Kaman whirl tower to establish basic stability and performance. The model will then be shipped to NASA-Ames where it will be tested in the 40 by 80 foot tunnel. The results will be carefully evaluated to determine the aeroelastic and performance characteristics of the CTR versus more conventional systems.

Supporting agency address information: AMC Army Air Mobility R&D Lab, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

1.0020, INVESTIGATION OF A FAN-IN-FUSELAGE ADVANCED ANTITORQUE SYSTEM TO REPLACE THE TAIL ROTOR ON A CONVENTIONAL HELICOPTER
G.W. CARSON, Kaman Corporation, *Bloomfield, Connecticut* 06002 (DAAJ02-73-C-0033)

The objective of this effort is to analyze and design a practical internal fan antitorque device for possible replacement of the tail rotor on a conventional single-main-rotor type helicopter. A fan-in-fin device is currently under construction, and this effort parallels that fan-in-fin with an alternative, employing a fan buried much more deeply in the helicopter structure for decreased vulnerability, decreased noise, improved dynamic behavior, and improved vehicle high speed characteristics.

This investigation incorporates guidelines that the fan be axial and internal, and the valving and felection mechanism be located at or near the extremity of the tail boom, to provide antitorque and yaw control force. Design details of the fan, the valve, the airflow deflector, and the associated ducting will be developed during this effort. Should the design prove feasible, follow-on efforts may be initiated to fabricate and bench-test a full scale model.

Supporting agency address information: AVSCOM Air Mobility Research and Development Laboratory, Eustis Directorate, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

1.0021, SECTIONALIZED HELICOPTER ROTOR BLADE ELEMENT TESTS
G.A. MCCOUBREY, Kaman Corporation, *Bloomfield, Connecticut* 06002 (DAAJ02-72-C-0101)

One potential method of increasing helicopter rotor blade repairability and hence decreasing life cycle cost is through the use of field replaceable, mechanically attached trailing edge sections. The objective of this program is to examine in detail the use of mechanical attachments for replaceable trailing edge sections.

A sectionalized rotor blade design will be developed and critical loadings calculated. Attachment designs will be developed considering all the variables involved, e. g. Fastener size, spacing, material thicknesses, tolerances, etc. Coupon tests will be performed to supply any missing engineering data and to determine the interaction between variables. A final design will be developed and full scale trailing edge section will be fabricated and tested under critical loading conditions.

Supporting agency address information: AVCOM Air Mobility R&D Lab, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

1.0022, AERODYNAMIC DESIGN OF IR SUPPRESSORS FOR ARMY AIRCRAFT
O.L. ANDERSON, United Aircraft Corporation, *Hartford, Connecticut* 06118 (DAAJ02-73-C-0037)

The primary objective of this investigation is to develop an analytical technique for predicting flow characteristics and pressure distributions for curved wall, centerbody-plug infrared suppressors. This analytical capability will permit accurate prediction of engine back pressure penalties and assist in determining hot parts coolant distribution.

An existing numerical procedure has been modified to account for effects of turbine swirl and coolant film injection. The current analysis scheme predicts the locations of flow separation and continues calculation beyond these points for moderate separation levels. A conformal mapping procedure has been incorporated for determining necessary inviscid flow characteristics and an implicit numerical integration routine has been developed. Hot flow testing of a full scale infrared suppressor at nine (9) operating conditions has been completed and comparisons with predicted numerical results are being made.

Supporting agency address information: AVCOM Eustis Directorate, Air Mobility R&D Lab, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

1.0023, ADVANCED TECHNOLOGY PLT-27 ENGINE EXHAUST EMISSIONS TEST
J. DEMAN, Avco Corporation, *Stratford, Connecticut* 06497 (DAAJ02-73-C-0068)

To acquire exhaust gas emission and noise data on the PLT-27 engine. This engine is considered representative of advanced cycle turbo-shaft engines. The data acquired will provide indications for the magnitude of the exhaust gas and noise pollution aspects of future aircraft engines of this type.

Assemble and test the complete PLT-27 engine. Measurements of CO, UHC and NOX will be made in addition to noise measurements. Test time will be approximately 20 hours.

Supporting agency address information: AVCOM Air Mobility R&D Lab, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

1.0024, AIRCRAFT ENGINE COST ANALYSIS
R. WEGMAN, Avco Corporation, *Stratford, Connecticut* 06497 (DAAJ02-73-C-0102)

The broad objective which encompasses this effort is to develop technology for reducing the cost of Army gas tubine engine components without compromising aerothermodynamic per-

formance. The effort under this program will be directed at establishing the baseline costs for the Army T53-L-13 engine/components. The objective will be to identify high cost components/elements and/or items which have potential for reducing life cycle costs and to investigate areas where additional effort is needed. This data will then be used in defining research programs aimed at reducing the acquisition and life cycle costs costs for Army gas turbine engine-components.

Perform a detailed review of the cost history of the T53-L-13 engine. Detailed engine parts lists and accounting data shall be analyzed to determine the manufacturing, tooling, material, labor, inspection, assembly, overhead and development cost of individual engine components and subelements. Significant changes in the cost of each component and/or a change in total engine price will be analyzed. Particular attention shall be given to the high cost components, ie., compressor, turbine and engine control and accessories.

Supporting agency address information: Army Air Mobility Res. and Dev. Lab, Eustis Directorate, Fort Eustis, Va.

SUPPORTED BY U.S. Dept. of Defense - Army

1.0025, ANALYTICAL STUDIES OF HELICOPTER ROTOR BROADBAND NOISE GENERATION 10299-E
R. AMIET, Sikorsky Aircraft, *Stratford, Connecticut* 06602 (DAHC04-72-C-0040)

An analytical study will be made to establish a closed form solution for predicting the broadband noise intensity radiated by helicopter rotors. This research should develop techniques which will reduce the aerodynamically generated noise made by helicopters.

Experimental studies will be made of isolated airfoils in an existing acoustic-wind tunnel. The data obtained and other existing data will be statistically analyzed to provide an empirical equation which will then serve as a measure by which the validity of the theoretical equation will be examined.

Supporting agency address information: OCRD Research Office Durham, Durham, N.C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

1.0026, FLIGHT LOADS INVESTIGATION OF HELICOPTER EXTERNAL PAYLOADS
W.E. BUEBNER, Sikorsky Aircraft, *Stratford, Connecticut* 06602 (DAAJ02-74-C-0016)

To determine the dynamic load factors produced in helicopter external cargo handling system components and hardpoints when the helicopter/external load combination as a system, is flown through a range of flight maneuvers. Flight tests will be performed. The resulting data will be compared with previous analytical and simulator programs. Overall objective is to provide an acceptable confidence level for external cargo handling load factors upon which design of all future equipment and establishment of operational procedures will be based.

A. Review existing pertinent literature. B. Establish testing and instrumentation requirements. C. Assemble instrumentation package for measurement of flight loads on cargo handling system and its interfaces. d. Perform flight tests. Tests will cover variety of flight profiles, payloads, and cargo handling system arrangements. E. Analyze data and compare with existing criteria.

Supporting agency address information: AVCOM Eustis Directorate, US Army Air Mobility Research and Development Laboratory, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

1.0027, ADVANCED OVERRUNNING CLUTCH PROGRAM, ARMY AIRCRAFT
J. KISH, Sikorsky Aircraft, *Stratford, Connecticut* 06602 (DAAJ02-74-C-0028)

This program will consist of the investigation of new as well as current helicopter overrunning clutch concepts with the overall objective of providing the technology necessary to design overrunning clutches characterized by improvements in performance and weight, and reduced developmental and unit cost while maintaining very high reliability and good maintainability.

The program is a four (4) phase program, outlined as follows- phase I and II - the work to be performed shall consist of an analytical investigation and preliminary design of proposed clutches with emphasis on outlining an analytical design tool for verification under a later phase of the program. Phase III - selected clutch candidates will undergo a detail design in conjunction with formulation of detail analytical design tools to fill the distinct void in this area which has retarded overrunning clutch development. In addition, a test program shall be developed with the objective of validating the analytical design tool for specific clutch configurations. Phase IV - specific clutch configurations shall be fabricated and tested. All test data will be analyzed to substantiate the analytical design tool, to validate potential performance gains, and identify possible design deficiencies. All design deficiencies will be corrected via redesign with follow-on verification test. A product of this program will be a design guide for aircraft clutches and their integration into advanced drive systems.

Supporting agency address information: AVCOM Eustis Directorate, Air Mobility Research and Development Laboratory, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

1.0028, SURVIVABILITY AND COOLING EVALUATION OF INTERMEDIATE AND TAIL AND TRANSMISSION GEARBOXES ON ARMY HELICOPTERS
D. WILSON, Sikorsky Aircraft, *Stratford, Connecticut* 06602 (DAAJ02-73-C-0040)

Recent efforts and more specifically work performed on the CH53 nose gearbox transmission have established the fact that heat dissipation and loss of lubrication present serious problems in the operation of Army helicopter transmissions under combat situations. Although current efforts are investigating these phenomena with respect to main rotor transmission, no work has been directed toward their application in variable speed intermediate and tail rotor transmission gearboxes. The objective of this work effort is to determine the effectiveness of internal cooling fin design on these gearboxes and to evaluate their minimal lubrication and survivability characteristics.

This effort will include the fabrication of a test facility for installation and zero lube tests of government furnished intermediate and tail rotor gearboxes. The necessary instrumentation systems will be provided for measuring speed, oil temperatures, oil pressure, oil flow, bearing/sump temperature, and frictional horsepower. A comparative engineering analysis will be made of the gearboxes being tested with and without internal cooling fins.

Supporting agency address information: AVCOM Eustis Directorate, US Army Air Mobility Research and Development Laboratory, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

1.0029, EVALUATION OF PIEZOELECTRIC PUMPING INTERFACE DEVICE FOR AIRCRAFT GAS TURBINE ENGINE FUEL CONTROLS
T. SOULE, United Aircraft Corporation, *Windsor Locks, Connecticut* 06096 (DAAJ02-74-C-0024)

To design and test a low cost electronic-to-mechanical interface for engine fuel control applications. Successful completion of this program would result in a smaller, less expensive and more reliable fuel control, which can reflect an advancement in Army aviation.

Program will be carried out in three (3) phase format. Design of a piezoelectric package and modification of an existing fuel control would comprise part one. Assembly and component testing would be accomplished in phase two. Phase three will involve system testing.

Supporting agency address information: AVCOM Eustis Directorate, US Army Air Mobility Research and Development Laboratory, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

1.0030, ADVANCED FEASIBILITY INVESTIGATION FOR DETERMINING ARMY HELICOPTER GAS TURBINE ENGINE MAXIMUM POWER AVAILABLE

L. URBAN, United Aircraft Corporation, *Windsor Locks, Connecticut* 06096 (DAAJ02-73-C-0047)

Hamilton standard has completed a program (USAAMRDL Contract DAAJ02-72-C-0003) to investigate the feasibility of predicting the maximum power available from a helicopter gas turbine engine with an accuracy of plus or minus 1 percent while making this prediction from data acquired at a low power condition of the engine (less than approximately 30 percent n.r.p.). The conclusions of this program were that such a prediction capability using low power data is not feasible. However, it was concluded that the desired prediction capability may be feasible if the ground rules are changed to permit use of parametric information obtained at higher power conditions (in the order of 50 percent n.r.p.) and the incorporation of a continuous update prediction method. The objective of this effort is to investigate this modified approach, to determine its feasibility, and to conduct experimental efforts to evaluate the accuracy of the approach.

The contractor will conduct analytical studies to accomplish the stated objectives and evaluate the maximum power available prediction method developed using actual T-53 engine data.

Supporting agency address information: AVCOM Air Mobility R&D Lab, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

1.0031, HINGELESS ROTOR SERVO-AEROELASTICITY 9549-E

M.I. YOUNG, Univ. of Delaware, School of Engineering, *Newark, Delaware* 19711 (DA-ARO(D)-31-124-71-G112)

To investigate the unique servo-aeroelastic characteristics of hingeless rotors. Hingeless rotors offer much promise for improved helicopter handling qualities as well as application to tilting propeller-rotor aircraft and stopped-stowed rotor aircraft. This study will complement advanced computer math models for helicopter aeroelastic studies.

Equations governing a single hingeless rotor blade will be developed, the dynamic stability of both small and large oscillations of individual blades will be studied, and the stability of the overall aircraft hingeless rotor system will be tested.

Supporting agency address information: OCRD Research Office Durham, Durham, N.C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

1.0032, RPV ADAPTIVE ARRAY BREADBOARD MODEL

G.G. RASSWEILER, Radiation Incorporated, *Melbourne, Florida* 32902 (F30602-73-C-0183)

To experimentally investigate the properties and characteristics of adaptive processing receiving antenna arrays, in order to determine feasibility and extent of applicability to remotely-piloted-vehicle, RPV, systems. In particular, a breadboard model of a small adaptive $eceiving array shall be fabricated and studied under conditions simulating realistic RPV airborne system use.

The contractor shall fabricate a breadboard implementation of the least-mean-square error, LMS, process for a four element adaptive receiving antenna array. The error generator circuit shall be a part of the implemented breadboard model, and tests shall be performed to determine if the circuitry generates the proper error signal under conditions simulating realistic RPV usage, with emphasis on signal acquisition from initial conditions. In parallel with the experimental studies, the contractor shall compare experimental results and findings with computer simulations, and determine level of agreement, perform computer parametric studies of adaptive array processing for RPV system evaluation, and shall determine feasibility and extent of applicability of adaptive array technology to RPV systems.

Supporting agency address information: Rome Air Development Center DCI, Griffiss AFB, N.Y. 13440

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0033, HOLOGRAPHIC HEADS UP DISPLAYS FOR NAVAL AVIATION TRAINING

A. RODEMANN, U.S. Navy, Training Equipment Center, *Orlando, Florida* 32813

Devise a heads up data display utilizing holographically produced Fresnel Zone plate elements having the advantage of multiple input channels to combine data received from more than one source. This device when applied to training simulation will expanded use of visual inputs to the trainee in a simpler way than presently feasible. These inputs may be items such as correction data, hit indications, instructor information, or commands.

Laboratory investigations will be performed into various parameters involved in image formation with holographically produced Fresnel Zone plates. These parameters will than be optimized to produce the highest quality image formation. Investigations will be undertaken into off axis image degradation and new techniques will be examined for overcoming this problem. Experimentation will be performed into producing an effective training device concept for HUD as well as optimizing multichannel data input techniques. A comprehensive review of current literature will be conducted in addition to direct contact with active research organizations performing related work.

Supporting agency address information: Naval Air Systems Command 340D, Washington, D.C. 20361

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0034, NAVY VEHICLE DESIGN AND CONSTRUCTION - ANALYSIS OF A CIRCULAR JET EJECTING IN A CROSS FLOW AND PARALLEL TO A LIFTING SURFACE

C.J. DIXON, Lockheed Georgia Company, *Marietta, Georgia* 30060 (N00014-74-C-0151)

To develop a means of predicting the characteristics of an underexpanded jet in the presence of a lifting surface with and without cross-flow. It is expected that a jet ejecting spanwise will provide wing leading edge vortex control for increased lift as well as contribute to improved stability and control in subsonic flight. In the high subsonic speed region there is the potential for reducing buffet intensity.

Analysis during a previous ONR Contract, N00014-72-C-0237, showed a need for more accurate prediction of the spreading or growth of the spanwise blowing jet in the presence of a wing. The several major parameters such as axial and transverse velocities, the turbulent structure, and eddy viscosity will be analyzed theoretically. Inputs to this theory will necessarily be the turbulent structure which must be obtained experimentally. Experiments, also necessary to validate the theoretical results, will use a back scatter laser Doppler velocimeter to measure the flow field velocities of the jet ejecting parallel to the airfoil surface and spanwise to the wing. All three components of velocity will be obtained over a planned distribution of the flow field.

Supporting agency address information: Office of Naval Research 411, Arlington, Va. 22217

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0035, AIRCRAFT GAS TURBINE COMBUSTOR NOISE INVESTIGATION

W.R. SEMRAU, General Motors Corporation, *Indianapolis, Indiana* 46206 (DAAJ02-73-C-0088)

To analyze previously measured combustor rig noise data to develop and/or update available analytical models for predicting gas turbine combustion noise. Determine the correlation, if any, between pertinent combustor performance parameters, such as combustor efficiency, exhaust emissions, and combustor noise levels. If successful, the analytical models could then be used to design more efficient, quieter and lower polluting combustors for Army gas turbine engines.

Previously measured noise data taken on approximately 30 combustor rig tests of several types of T63-sized can combustors shall be used to develop analytical models for predicting combustor noise. Investigation will attempt to correlate the effects of varying combustor geometry (i.e., dilution hole scheme, cooling technique, etc.) and performance parameters on combustor noise levels.

Supporting agency address information: AVCOM Eustis Directorate, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

1.0036, ROLE OF TURBULENCE IN VORTEX WAKE DECAY
L.N. WILSON, Iowa State University, School of Engineering, *Ames, Iowa* 50010 (NSG 2040)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

1.0037, IN-FLIGHT THRUST CONTROL
L.A. STULTS, U.S. Navy, Air Test Center, *Patuxent River, Maryland* 20670

Develop and flight test prototype hardware in order to evaluate the feasibility of the concept. Flight tests to include functional, flying qualities, durability, evaluation of thrust reverser for various missions. Determine suitability of hardware for thrust engine operation effects, performance and employment techniques augmentor wing concept.

Develop and flight test prototype hardware in order to evaluate the feasibility of the concept.

Supporting agency address information: Naval Air Systems Command 530141B, Washington, D.C. 20360

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0038, CONTROL STICK DESIGN IN A VIBRATION ENVIRONMENT
W. LEVISON, Bolt Beranek & Newman Inc., *Cambridge, Massachusetts* 02138 (F33615-74-C-4041)

The pilot controlling an aircraft in a buffet environment shows degradation of performance due to neuro-muscular feedback and direct vibration feedthrough from the shoulder to the control stick. The objective of this research is to provide the aircraft design community with the control stick design criteria that will allow pilots with 5-95 percent anthropometric dimensions to perform optimally in vibration environments.

The experiment, using anthropometric size and control stick properties as variables will be conducted by AMRL/BBV personnel. The contractor will reduce the data, develop human operator describing functions, and model the biomechanical feedthrough of the vibration. These models will then be used to interpret results and find the optimum control stick propertieis (force gradient and position of stick) to maximize performance.

Supporting agency address information: 6570 Aerospace Medical Rsch. Lab BB, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0039, SUPERCONDUCTING MHD MAGNET COMPREHENSIVE TESTING
THOME, Magnetic Corporation of Amer., *Cambridge, Massachusetts* 02124 (F33615-72-C-2069)

To develop lightweight, superconducting, saddle-shaped magnets for airborne magnetohydrodynamic (MHD) power generation. The program will exploit a design concept to obtain a high field, low weight, flightworthy MHD magnet. This effort is in support of the Air Force MHD power generation effort which is developing megawatts of power for airborne applications. The superconducting magnet development effort is also in support of the superconducting AC machinery and inductive energy storage efforts, which will provide power for several other high energy Air Force applications.

The magnet will be inspected for any obvious damage produced during the previous testing. Appropriate modifications (including vacuum parafin impregnation) will be made on the magnet and retesting will be accomplished with thorough diagnostics and a vibrator for avoiding 'training quenches'. A race track model coil will be constructed and tested to study quenches induced by wind movements and structural models will be built to study various impregnation materials. The magnet will be tested a second time with the individual coil sections energized to high current densities within the coils structural limitations (determined by the structural model tests described above). Finally, design drawings (not construction drawings) will be generated for a diverging channel 10 megawatt level MHD magnet system.

Supporting agency address information: AF Aero-Propulsion Laboratory POP, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0040, CONDUCT STUDY OF HELICOPTER VIBRATORY AIRLOADS
N. HAM, Mass. Inst. of Technology, Division of Sponsored Res., *Cambridge, Massachusetts* 02139 (N00019-74-C-0321)

To develop a better understanding of the sources of vibratory airloads which can be used to develop better computational methods.

The contractor will study the theoretical interaction between the tip vortex of one blade and the extra trailing wake generated by passage close to another blade; theoretical and experimental tip vortex formation and blade tip loading for various blade tip configurations, and the experimental interaction between a tip vortex and a blade in terms of vortex stability and interference with blade wake vorticity.

Supporting agency address information: Naval Air Systems Command 530214A, Washington, D.C. 20361

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0041, ENGINE EXHAUST EMISSIONS MEASUREMENT SYSTEM
D.A. LEONARD, Avco Corporation, *Everett, Massachusetts* 02149 (F33615-71-C-1875)

Develop a system based on laser raman spectroscopy for simple, real time, non-interference measurement of carbon monoxide, carbon dioxide, oxides of nitrogen, organic and other exhaust emissions from aircraft gas turbine engines. Program is to produce an engineering prototype as a technology feasibility demonstrator.

Two phase program: First phase will consist of laboratory determinations of the raman spectra and investigation of possible spectral interferences as a function of subject gas mixture temperature. Second phase will consist of development, including a field test, of an engineering prototype.

Supporting agency address information: AF Aero-Propulsion Laboratory SFF, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0042, JOINT ARMY-NAVY AIRCRAFT INSTRUMENTATION RESEARCH (JANAIR) -- LIFT MARGIN INDICATOR
S.B. WILLIAMS, Trans Sonics Incorporated, *Lexington, Massachusetts* 02173 (N00014-68-C-0300)

To develop techniques to derive and display actual effective lift margin (excess of actual lift capability over effective gross weight) for rotary wing aircraft in and out of ground effect at all atmospheric conditions. The lack of a lift margin indicator in present helicopters has resulted in numerous catastrophic accidents- therefore, this indicator will directly support the CDOG for an environmental instrument panel (512b(12)), UTTAS (512b(18)), and HLH (512b(16)).

An experimental program for the investigation of lift margin technique will result in a feasibility model to be subjected to laboratory and flight test. The concept to be investigated uses atmospheric and engine data to compute both lift and effective gross weight to yield lift margin with provision being made for such special requirements as occasioned by ground effects, airspeed and engine- stopped conditions. Phase I addressed feasibility of basic concept. Phase II will investigate automatic environment and engine data sensing with emphasis on HLH and twin rotor helicopter applications.

Supporting agency address information: ECOM Avionics Lab, AMSEL-VL- D, Ft. Monmouth, N.J. 07703

SUPPORTED BY U.S. Dept. of Defense - Army

1.0043, PREFABRICATED AIRFIELD & ROAD SURFACING MEMBRANE
R.H. GRAU, U.S. Army, Waterways Experiment Station, *Vicksburg, Mississippi* 39180

Design and fabricate prototypes of experimental airfields and road surfacing membranes used as dustproofing and waterproofing wearings surfaces for soil subgrades. The membranes will be used on airfields, heliports, and military roads in support of tactical operations. Membranes will also be placed beneath landing mats as water-proofing mediums. The membranes will reduce the time and support required to construct hastily prepared airfields, heliports, and roads, improve tactical mobility and operational flexibility of using agencies, and provide a replacement for the existing membrane, prefabricated bituminous surfacing (PBS) which is inadequate for current military requirements.

Design various geometric configurations of synthetic fabrics, coat these fabrics with elastomers, and determine inherent physical properties of these materials. Fabricate most promising materials and develop techniques that satisfy military requirements for surfacing runways, taxiways, parking aprons, helicopter landing pads, heliports and military roadways.

Supporting agency address information: OCE Waterways Experiment Station, Vicksburg, Mi. 39180

SUPPORTED BY U.S. Dept. of Defense - Army

1.0044, APPLICATION OF HUMAN RESOURCES DATA TO DESIGN TRADE STUDIES

G.V. WHALEN, McDonnell Douglas Corporation, *St. Louis, Missouri* 63166 (F33615-73-C-4150)

The objectives of this study are- 1. Determine the different types of tradeoff studies that are performed during development of a weapon system and which could use human resources and personnel cost data, and 2. Assess the reliability, validity and utility of several methods of measuring and predicting the effects of system design tradeoff alternatives on the human resources of the Air Force. The study will, in coordination with the Deputy for Development Planning, Aeronautical Systems Division, focus on aircraft subsystems significant to the Advanced Tactical Fighter (TAC ROC 301-73). This will allow determining the feasibility of measuring the impact of design alternatives on human resources and personnel cost during the early concept phase of weapon system development.

The method includes- 1. Analyzing a large number of weapon system tradeoff studies and constructing a taxonomy of types of tradeoffs, 2. Determining the relevance of various classes of human resources data to the different types of tradeoff studies, 3. Constructing design engineering data packages for two aircraft subsystems of the F-4, F-111, and Advanced Tactical Fighter, 4. Predicting the human resource requirements for the F-4 and F-111 subsystems using analytical and expert judgement methods, 5. Validating the predicted data against operational data.

Supporting agency address information: AF Human Resources Laboratory ASR, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0045, INTEGRATED FIRE AND OVERHEAT DETECTION SYSTEM FOR AIRCRAFT

R. RYER, McGraw Edison Company, *Orange, New Jersey* 07051 (F33615-72-C-1053)

The objective of this program is to develop a flight qualified integrated system with potential application for the engine compartments of an advanced multi-engine aircraft like the B-1. This system will distinguish between a fire and an overheat condition and provide highly reliable hazard detection capability.

(a) Design and develop an integrated system for application on an advanced multi-engine aircraft which meets the following requirements- (1) Six ultraviolet radiation detectors, each with two sensors and test source, (2) Dual loop overheat cable, (3) Computer control unit, (4) Crew readout unit, and (5) Maintenance warning unit. (b) The following syqtem performance tests shall be performed- (1) Environmental tests in accordance with MIL-STD-810-A, (2) Environmental and performance tests in accordance with MIL-F-7872-C, and (3) Environmental and performance tests in accordance with MIL-D-27729-A. (c) System design, performance specifications and maintenance instructions will be documented. (d) Periodic verbal progress reports will be given during program.

Supporting agency address information: AF Aero-Propulsion Laboratory SFH, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0046, NIGHT VISION TECHNIQUES FOR FORMATION FLIGHT

M.J. WILKEN, U.S. Army, Avionics Laboratory, *Red Bank, New Jersey* 07703

To develop night vision formation flight techniques and to select, design, develop, and flight test night vision formation flight systems which will permit Army helicopters to fly in formation and land more readily and safely at night. The effort is in direct support of the COTAWS QMDO, CDOG Paragraph 512B(3).

Procure, adapt for the helicopter environment, and flight test candidate off-the-shelf(or modified) night vision devices such as electroluminescent panels (EL) and rotor tip lights, night vision goggles, binocular fiber optic night scope, and thermal imaging devices.

Supporting agency address information: ECOM Avionics Lab, AMSEL-VL- D, Ft. Monmouth, N.J. 07703

SUPPORTED BY U.S. Dept. of Defense - Army

1.0047, ADVANCED AVIONIC SYSTEMS ANALYSIS

S.J. ZYWOTOW, U.S. Army, Advanced Avionics Sys. Tec. Ar, *Red Bank, New Jersey* 07703

To synthesize candidate avionics systems which will meet the avionics requirements of new generation Army aircraft and produce improved in-service aircraft. The task comprises four basic efforts- aircraft mission analysis, subsystem modelling and capability assessment, advanced systems synthesis, and effectivity/cost analysis. The synthesized systems will form a data base for the preparation of required operational capability (ROC) documents and systems specifications. This task will identify those barrier problems which prohibit current Army avionics systems from meeting future requirements.

Emphasis will be on those missions which require Army aircraft to have night low level or instrument meteorological conditions (IMC) flight capability. Subsystem modelling and capability assessment- efforts focus on precision hover sensors (micro-wave, infrared, electro- optical), rotor blade and forward looking radars, pilot night vision systems, and night vision goggles. Capability assessment will be achieved through data collection efforts involving static and flight tests. Mathematical models will be formulated. Advanced systems synthesis- the data base of subsystem modelling and capability assessment effort will be used to synthesize complete avionics systems to meet the requirements identified in the aircraft mission analysis effort. Fy-74 system synthesis efforts will focus on the MEDEVAC and HLH. Effectivity/cost analysis- tradeoffs between the candidate systems will be performed under this effort. Work will focus on reliability and cost modelling, vulnerability and threat analysis, and total system performance analysis.

Supporting agency address information: ECOM Avionics Laboratory, AMSEL-VL-F, Ft. Monmouth, N.J. 07703

SUPPORTED BY U.S. Dept. of Defense - Army

1.0048, RESEARCH ON BOUNDARY LAYER SEPARATION 6152-E

R.C. ACKERBERG, Polytechnic Inst. of New York, School of Engineering, *Brooklyn, New York* 11201 (DA-ARO(D)-31-124-73-G91)

To obtain an asymptotic solution of boundary layer equations valid near the separation point. The detailed mechanisms of flow separation particularly in the unsteady portion of this program are of primary importance to rotor boundary layer research. This study is also of direct relevance to on-going Army research in aeronautics, aerospace and in large hydraulic structures (conduits, penstocks, locks).

Asymptotic solution of the boundary layer equations, which is valid near free streamlines and which exhibits the skin friction singularity, will be attempted. An experimental apparatus is being built for study of this behavior of the boundary layer.

Supporting agency address information: OCRD Research Office Durham, Durham, N.C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

1.0049, HIGH DENSITY HELICOPTER LANDINGS (HDHL)
J. VOLPE, Cutler Hammer Incorporated, *Farmingdale, New York* 11735 (DAAB07-73-C-0208)

The objective of this task is to determine the ability of candidate tactical landing systems to provide useable guidance for multiple (closely spaced) aircraft landings. Under this this task a collocated Ku-band landing interrogator set will be integrated with an AN/TPX-42, the DOD standard ground interrogator set. Also, the A-scan Airborne Landing Set (an Army exploratory development equipment) will be interfaced with the Standard Airborne Transponder AN/APX-72. The total system will operate in a crossbanded mode wherein the airborne l-band transponder is caused to reply to 'interrogating' Ku-band scanning beam landing system signals which are, at the same time, providing the pilot with the usual approach and landing information. With this system, the positions of several aircraft performing simultaneous approaches to the landing system can be determined (on the ground) with a resolution satisfactory for high density landing experimentation.

The contractor will design, develop, fabricate, test and integrate- interconnect a Ku-band landing/interrogator set with the AN/TPX-42 interrogator set for crossbanded operation. Laboratory, field and flight tests sufficient to demonstrate the suitability of the equipment will be conducted by the contractor prior to delivery to USAECOM. Further testing will be conducted at USAECOM where the equipment will be subjected to a high density helicopter landing environment.

Supporting agency address information: ECOM Avionics Lab, AMSEL-VL- N, Ft. Monmouth, N.J. 07703

SUPPORTED BY U.S. Dept. of Defense - Army

1.0050, AIRBORNE CONFORMAL PHASED ARRAY ANTENNA SYSTEM
M. SIMPSON, Sedco Systems Incorporated, *Farmingdale, New York* 11735 (DAAB07-72-C-0239)

To develop phased array antennas which conform to the contour of the nose portion of the UH-1 and/or LOH helicopters' fuselage and which are scannable in azimuth and have a beam shaped in elevation. Also, develop a means for stabilization of such antennas for yaw, pitch and roll. Do this in order to provide improved airborne, forward-looking MIT radars.

Perform a theoretical and experimental investigation which consists of- (a) the analysis of applicable techniques and (b) the design, construction, test and evaluation of a demonstration model configured for the UH-1 and/or LOH helicopters.

Supporting agency address information: ECOM CS & TA Lab, Ft. Monmouth, N.J. 07703

SUPPORTED BY U.S. Dept. of Defense - Army

1.0051, RESEARCH ON HELICOPTER NOISE 9372-E
W.R. SEARS, Cornell University, School of Engineering, *Ithaca, New York* 14850 (DAHC04-74-C-0001)

To discover, refine, and exploit techniques for the analysis and predictions or aerodynamic noise, in particular the noise produced by helicopters and similar-aircraft, for the purpose of finding techniques for reduction of such noise. The successful field operation of Army helicopters is jeopardized by the noise environment in three ways. Helicopter noise increases the vulnerability of both the machine and crew to ground fire, distracts the crew in the performing of their duties, and induces sonic fatigue in construction elements. Thus, this investigation has a high degree of relevance to effective utilization of rotorcraft since it will identify noise sources and describe noise propagation relative to helicopters.

Theoretical studies, numerical computations, and laboratory experiments will be performed.

Supporting agency address information: OCRD Research Office - Durham, Durham, N.C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

1.0052, NAVY VEHICLE DESIGN AND CONSTRUCTION - TRANSONIC FLOW VISUALIZATION BY BUBBLES
D.C. LAUVER, Sage Action Incorporated, *Ithaca, New York* 14850 (N00014-71-C-0266)

To significantly improve transonic airflow visualization necessary for adequate description of transonic flight characteristics by means of streamline tracing helium-filled bubbles. The development of such flow tracers by practical means will provide an extremely useful tool for examining the characteristics of transonic flows.

An analytical and experimental, exploratory effort will be conducted to develop new bubble film materials and increase bubble film reflectivity. A device for rapid generation of neutrally-buoyant bubbles will be developed, and an image intensifier will be incorporated to enhance the trace recording capabilities of the present system. Visualization tests will be conducted in two sizes of transonic wind tunnels.

Supporting agency address information: Office of Naval Research 411, Arlington, Va. 22217

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0053, DEVELOP AN IMPROVED DESIGN TOOL FOR PREDICTING AND SIMULATING HELICOPTER ROTOR NOISE
K. JOHNSON, Rochester Applied Sci. Assoc., *Rochester, New York* 14618 (DAAJ02-73-C-0061)

This study is an extension of the effort performed under Contract DAAJ02-71-C-0064 which investigated the development of a computer program capable of predicting the noise generated by a helicopter rotor. The research performed under this initial study, however, revealed the need to incorporate other phenomena that directly affected the rotor noise signature as detected by an observer. The objective of this study, therefore, is to improve the basic (original) computer tool by incorporating the effects of rotor noise variability due to individual blade passage, ground reflection, and blade-vortex interaction. The addition of these elements to the program will enhance the accuracy of the predictive procedures and provide simulated noise tapes that more precisely duplicate the true helicopter sound. This tool, consequently, will provide the design engineer with the means to accurately predict the noise signature expected from a new helicopter design and enable him to investigate with better precision the effects of blade design changes on the noise producibility of a particular rotor design.

The contractor will study new available noise tapes (NASA) relative to the mechanism identifiable with the three phenomena cited above. Spectral analyses of the noise will be performed for mathematical interpretation. The basic computer program will then be modified to incorporate the new findings.

Supporting agency address information: AVCOM Eustis Directorate, US Army Air Mobility R&D Lab, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

1.0054, PERFORMANCE CHARACTERISTICS OF ADVANCED CONCEPTS, ARMY HELICOPTERS
K. SHIPMAN, Rochester Applied Sci. Assoc., *Rochester, New York* 14618 (DAAJ02-73-C-0030)

A computer program 'package' which can be used to calculate stability and performance characteristics for existing and advanced helicopter rotor systems (e.g. ABC, CTR, TRAC) in steady forward flight and hover is to be developed using existing contractor's programs which analyze the freely deforming wake and blade loads of the rotor system. The work once completed will allow rotor system simulation and evaluation relevant to the Army's continuing effort to improve its air mobility role.

The programs to be used by the Army are based upon an existing set of programs developed under previous government sponsorship. These programs shall be modified as needed to provide an efficient general tool for analysis of performance and rotor system stability characteristics of such rotor systems as the TRAC, ABC, CTR and tandems. The analysis capability would include the effects of a distorted wake and flexible blades in steady forward flight with climb or descent with trim conditions determined by the C-81 program.

Supporting agency address information: AVCOM Eustis Directorate, US Army Air Mobility R&D Lab, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

1.0055, ENGINE EROSION PROTECTION FOR ARMY AIRCRAFT GAS TURBINE ENGINES
C.R. MANNING, Univ. of North Carolina, School of Engineering, *Raleigh, North Carolina* 27600 (DAAJ02-73-C-0028)

To investigate the erosion process and to extend existing erosion models and/or develop new erosion models which will enable the gas turbine engine designer to predict erosion rates based on material properties and characteristics of impinging particles. The results of this effort will be utilized to increase the life and reliability of Army aircraft engines in their operational environment.

(1) Conduct erosion test and utilize the results to verify or modify and refine existing erosion models; (2) develop a new erosion model based on the thermodynamic properties of the target material and the impacting particles; (3) determine the usefulness of the two models through experimental validation.

Supporting agency address information: AVSCOM Air Mobility Research and Development Laboratory, Eustis Directorate, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

1.0056, IMMINENT ENGINE FAILURE PROBE INVESTIGATION
W. SCHAFFERNOCKER, General Electric Company, *Cincinnati, Ohio* 45215 (F33615-73-C-2048)

A. To evaluate and develop through detailed analyses and comprehensive controlled testing the potential of a simple electrostatic probe and associated electronics to detect and/or predict imminent mechanical failures in the gas path of turbine engines by detecting charged metal particles in the core exhaust. B. Define an improved electrostatic probe system and design and construct a sophisticated engine condition monitoring system, within which the probe would be one sensor for determining engine health.

Phase I- fundamental investigations in rig tests to link probe theory with actual probe performance and operating characteristics. Phase II- rig and engine tests to determine the characteristic 'signature' of various engines and to gather performance data on the probe in full scale engines under simulated flight conditions. Phase III- documentation tests to test an improved probe system in a 'run for the record' test. Phase IV- flight test an AFSC and/or contractor test aircraft.

Supporting agency address information: AF Aero-Propulsion Laboratory TBP, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0057, INVESTIGATION OF SMALL TURBINE AERODYNAMICS 10223-E
W. TABAKOFF, Univ. of Cincinnati, School of Engineering, *Cincinnati, Ohio* 45221 (DAHC04-69-C-0016)

To study the basic phenomena underlying the performance of air- breathing propulsion systems to increase performance by improving the turbomachinery, reducing the overall engine weight, improving the structural design and improving the performance of the nozzle. This THEMIS project is directed toward those metallurgical and aerodynamical features indigent to the design and performance of air-breathing propulsion engines such as gas turbines used for military purposes. In attaining best engine efficiency, aerodynamic knowledge of the gas or air flow about the turbine blades is very necessary. It is equally necessary that proper cooling methods and better turbine blade materials be developed for the blade to protect it from burnout or over heating.

Theoretical and experimental investigations are planned in the following areas- heat transfer, cascade flow, stresses and vibrations, blade erosion and solid particle impingement, gas flow mixing, transonic nozzle performance, high temperature materials, and dynamic distortion. All of the studies will be oriented toward high temperature analyses, since advanced systems will operate at significantly higher engine cycle temperatures.

Supporting agency address information: OCRD Research Office Durham, Durham, N.C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

1.0058, INVESTIGATION OF SMALL TURBINE AERODYNAMICS 10223-E
W. TABAKOFF, Univ. of Cincinnati, School of Engineering, *Cincinnati, Ohio* 45221 (DA-ARO(D)-31-124-71-G154)

Investigate the fundamental phenomena of gas flow in small gas turbines. The Army helicopter and V-STOL aircraft types depend, in the majority of cases, on small gas turbines for their main propulsion power plant. Presently, there is an extremely expensive engine maintenance requirement and much 'down time' needed to keep the main power plant operative. In considerable part this is due to turbine blade erosion and brittle failure of these rapidly rotating engine parts. Research, such as this now being undertaken, if successful, will lead to a more efficient power plant in terms of power output and reduced 'down-time' for blade replacement and blade damage to the engine.

(1) Analytical cascade loss prediction, (2) small turbine experimental loss investigation, (3) erosion phenomena investigation in axial flow turbine, (4) experimental investigation of trajectories and velocities of solid particles through a supersonic compressor cascade, (5) theoretical investigation of trajectories of solid particles through a cascade nozzle.

Supporting agency address information: OCRD Research Office Durham, Durham, N.C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

1.0059, CONDUCT A STUDY OF FINITE SOLUTIONS FOR INTERACTING TURBULENT BOUNDARY LAYERS
M.J. WERLE, Univ. of Cincinnati, School of Engineering, *Cincinnati, Ohio* 45221 (N00019-73-C-0223)

To provide a fast and accurate numerical scheme for solving turbulent boundary layers interacting with superionic mainstream. Ultimately this effort should provide a rational and reliable means of attacking the problem of separation induced by an oblique shock wave striking a turbulent boundary layer.

The contractor will obtain finite difference solutions to the turbulent boundary layer equations using the eddy viscosity model. The effect of heat transfer on the interacting boundary layer properties near separation in the separation bubble and reattachment will be studied. A study will be made of the surface heat transfer behavior in and about the separation point where a rapid increase in heating rate has been observed experimentally.

Supporting agency address information: Naval Air Systems Command 320C, Washington, D.C. 20361

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0060, INVESTIGATION OF ACCELERATED LIFE PREDICTION TECHNIQUES FOR ARMY HELICOPTER COMPONENTS
J.A. COLLINS, Ohio State University, School of Engineering, *Columbus, Ohio* 43212 (DAAJ02-74-C-0033)

The objective is to derive mathematical models for the wear failure mode and to develop accelerated test techniques for wear based on these models. Accelerated tests will be performed to test the validity of the models.

Current theories of the wear phenomena will be examined for validity and applicability to mathematical modelling. Accelerated tests (based on the models) will be compared with test conducted under normal stresses and with operational failure data to determine the validity of models.

Supporting agency address information: AVCOM Eustis Directorate, Air Mobility Research and Development Laboratory, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

1.0061, INVESTIGATION OF GEAR DYNAMIC SIGNAL ANALYSIS OF HELICOPTER POWER TRAINS
D.R. HOUSER, Ohio State University, School of Engineering, *Columbus, Ohio* 43212 (DAAJ02-73-C-0103)

The Army is investigating the many means of utilizing vibration signals from helicopters in ascertaining the condition of mechanical components in the primary power train. Several broad classes of techniques have been investigated. It has been determined that the techniques for gear diagnostics have been only marginally successful. One of the primary reasons for this is the lack of understanding of the gear meshing phenomena and the changes in the gear dynamics which occur when gears start to deteriorate. Of particular interest are the changes in amplitudes of signals at the gear mesh frequency, its harmonics, and sideband frequences and how these changes are related to specific failure modes.

The contractor shall conduct a comprehensive investigation of the gear meshing phenomenon including development of a dynamic model of the gear meshing action and shall run a series of tests of this model with experimental data from a test stand. This model should make predictions of vibration levels and changes in frequency amplitudes at the gear mesh fundamental, harmonies and sideband frequencies. The model should provide for simulation of the structural dynamics between the gear mesh and the transducer location. The model will initially be applied to normal wear and pitting failures in spur gearing, but should be chosen for future adaptation to other gear types including helical and spiral bevel gears.

Supporting agency address information: AVCOM Eustis Directorate, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

1.0062, TECHNICAL SERVICE FOR RPV VIDEO SIMULATOR

T. IZEN, Systems Research Labs. Inc., *Dayton, Ohio* 45432 (F33615-74-C-5144)

The objectives of this contract are to provide technical services support in two specific areas- (1) preliminary data processing and reduction, and (2) SMK-43 maintenance and/or repairs of inoperative functions, i.e., ceiling, scud and visibility. This contract supports in-house effort 7233-04-16, 'Self-Organizing Control/RPV Augmentation.'

AMRL will study a part of the man-machine interface problem in support of the ASD/RWD CDRS Program through the coupling of the AMRL RPV Simulator (PDP-12 Computer) and the Mark VI SOC Controller to the AFIT SMK-43 Visual Simulator. By this coupling, via microwave video and hardwire control data links, an integrated system will be realized for the development of man-machine interface technology and optimization of the remote operation of RPVS. Specifically, AMRL/BBM will evaluate various controllers (i.e., bang-bang, proportional, adaptive) in terms of the operator's performance and to provide families of operator performance curves for the controllers as a function of operator information. In this effort the contractor will conduct a preliminary pilot study of the data reduction and processing necessary to evaluate the effectiveness or utility of the controllers in terms of RPV operator performance. This study will examine the number of experiments to be conducted within a cell in order to provide statistical validity to the experimental results. In addition, the contractor will provide maintenance to the SMK-43 to restore inoperative function, i.e., ceiling, scud, visibility. The contractor will determine the source of SMK-43 platform noise and correct the jittering platform so that this will not invalidate the studies.

Supporting agency address information: 6570 Aerospace Medical Rsch. Lab BB, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0063, DESIGN AND FABRICATION OF A REMOTELY PILOTED VEHICLE (RPV) OPERATOR CONSOLE

K.A. ONDICK, Systems Research Labs. Inc., *Dayton, Ohio* 45432 (F33615-74-C-4060)

The purpose of this effort is to design and fabricate remotely piloted vehicle (RPV) control console suitable for providing, when properly integrated with existing AMRL(EM) simulation systems, dynamic simulation of an RPV flying the weapon delivery phase of an air to ground mission. This effort will contribute to research, analysis and development programs which are necessary to answer questions pertaining to the optimum possible weapon delivery capability for remotely piloted weapon systems.

The RPV operator console shall be developed as a manual control console which, when integrated with and powered by the current simulation systems within AMRL(EM), will dynamically simulate an RPV piloting station. The contractor will provide engineering services leading to the design and fabrication of an RPV control console suitable for dynamic simulation studies. These services will provide a control console for an air to ground RPV mission capability for the RPV operator to obtain sensor (especially visual) acquisition of the target(s), lock on the track and perform pull up and evasive maneuvers. The simulation will include the capabilities to perform takeoffs and landings and navigate at low levels in the target area(s). The console will include the controls and displays best suited for performance of these mission tasks.

Supporting agency address information: 6570 Aerospace Medical Rsch. Lab EM, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0064, STRUCTURAL INTEGRITY PROGRAM, ARMY HELICOPTERS

R.B. JOHNSON, Technology Incorporated, *Dayton, Ohio* 45431 (DAAJ02-73-C-0053)

The objective is to establish the feasibility of a cost effective monitoring system for tracking fatigue critical components in Army helicopters. A monitoring system has the potential of increasing operational useful life of critical components, extending inspection intervals and improving maintenance procedures.

A realistic usage spectrum will be developed for each of two Army helicopters, the fatigue critical components will be defined and five monitoring systems for each helicopter will be evaluated for technical acceptability and cost effectiveness. The most promising monitoring system will be selected and a flight test program will be defined for evaluating monitoring system hardware.

Supporting agency address information: AVCOM Eustis Directorate, US Army Air Mobility R&D Lab, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

1.0065, DYNAMIC LOADS AND STRUCTURAL CRITERIA, ARMY HELICOPTERS

S.W. RUSSELL, Technology Incorporated, *Dayton, Ohio* 45431 (DAAJ02-74-C-0017)

The purpose of this procurement is to improve structural design criteria by establishing mission profile definitions that are representative of intended helicopter usage and that provide uniform design requirements. Mission profiles will be developed for observation, utility, utility tactical assault, attack, crane, and transport type helicopters. Major differences between model specifications and utilization will be discussed. The results of this effort will have broad application throughout helicopter design- for this reason, two contracts have been let to accomplish this work- one to a helicopter company and one to a non-helicopter company.

Mission profiles for several types of helicopters will be developed from operational data, original model specifications, and applicable military specifications. Major differences between model specifications and utilization data will be examined and related to the new profiles being developed. Mission profile segments in which high loading, high vibration, and/or high fatigue damage rates occur will be identified.

Supporting agency address information: AVCOM Eustis Directorate, US Army Air Mobility Research and Development Laboratory, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

1.0066, DEVELOPMENT OF A CORRELATION BETWEEN GAS TURBINE ENGINE SMOKE PRODUCTION AND CLEAR-DAY JET PLUME VISIBILITY

W.S. BLAZOWSKI, U.S. Air Force, Aero Propulsion Lab., *Dayton, Ohio* 45433

The objective of this program is to define and measure far-field visibility (FFV) of an aircraft exhaust trail and to develop an accurate relationship between FFV and the smoke numbers of the

aircraft engines. Of special interest is far-field visibility from worst-cast siting, i.e., when the aircraft is approaching or departing from the observer.

A combined contractual/in-house effort is necessary. The contractor will develop a plume dispersion model that will predict plume visibliity from engine smoke number. Moreover, the contractor will establish a highly specific photographic technique for measuring farfield visibility. AFAPL and the 4950th Test Wing will be responsible for obtaining exhaust plume smoke data from KC-135 and F-4 aircraft at WPAFB. The visibility prediction model will be verified by in-flight photographic measurement of 4950th aircraft exhaust plumes.

Supporting agency address information: AF Aero-Propulsion Laboratory SFF, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0067, ADVANCED FIRE, EXPLOSION AND OVERHEAT DETECTION CONCEPTS FOR AIRCRAFT
D.G. FOX, U.S. Air Force, Aero Propulsion Lab., *Dayton, Ohio* 45433

To select a multiplexing technique; pulse code modulation (PCM), pulse amplitude modulation (PAM) etc., and determine the most optimum method for using all available hazards sensors to inform crew members of the type, location and size of hazard and what should be done about it. To directly digitize and address transducers so that interrogation by the multiplexer can be direct and efficient. A flight qualified system capable of providing rapid collated instructions and information to crew members is the goal of this program.

Select an optimum multiplex technique for aircraft use. Purchase an off-the-shelf unit for testing having the qualifications defined above. (number of words, clock frequency, number of bits in a word, etc.) Analyze available transducers for the direct application to the multiplexer and design new electronics as required. Analyze hazardous areas to determine information and sensor requirements. Build final unit.

Supporting agency address information: AF Aero-Propulsion Laboratory SFH, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0068, DEVELOPMENT OF RIGOROUS SIMULATOR TEST TECHNIQUES
I.M. GUTERMAN, U.S. Air Force, Human Resources Laboratory, *Dayton, Ohio* 45433

The objective of this effort is to provide the Air Force with an in-house capbability for the development of rigorous test outlines for the flight and engine portions of weapon system flight simulators. The work is in support of an ASD/ENC request made in a letter dated 27 Feb. 1974, subject 'Development of a Rigorous Test Criteria Program' and a technical need that is in preparation. The program will direct itself toward providing a test outline for the A-10 aircraft and will be sufficiently generalized to provide modification to other aircraft.

A study will be made to determine acceptance tests to be programmed and the order of priority. The study will review the test specified in MIL-T-9212B and the portion of the flight and engine math model that they are intended to verify. Once the priority has been established a computer program will be written for the A-7D aircraft on the AFHRL STARS System. After the program has been verified for the A-7D a model will be developed for the A-10 aircraft and an A-10 test outline will be run. Results will be documented in two TRs, one for the study of the individual tests and one for the computer program.

Supporting agency address information: AF Human Resources Laboratory ASM, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0069, QUIET PROPELLER CONCEPT EVALUATION
C. LYON, U.S. Air Force, Aero Propulsion Lab., *Dayton, Ohio* 45433

The objective of this program is to evaluate the noise characteristics of various tail rotor configurations to determine the noise reduction potential of various new designs. Variables to be investigated include number of blades, blade to hub phasing angles and blade length.

This exploratory research program is divided into three phases as follows: Phase I - Analytical prediction. This phase consists of the development of analytical techniques to predict the performance and acoustic characteristics of the various tail rotor configurations under consideration. The prediction programs will then be used to select the final test configurations. Phase II - Experimental verification. This phase consists of the experimental verification of predicted performance and acoustic characteristics utilizing the propeller acoustics static test facility. Static performance and near-field acoustic data will be acquired for representative configurations. Phase III - Correlation. This phase consists of a comparison of the results acquired during Phases I and II, modification of the prediction methods developed during Phase I where necessary, and development of design procedures for reducing propeller and rotor noise.

Supporting agency address information: AF Aero-Propulsion Laboratory TBC, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0070, PROPELLER ACOUSTICS RESEARCH
C. LYON, U.S. Air Force, Aero Propulsion Lab., *Dayton, Ohio* 45433

The overall objective of this program is to experimentally determine the noise generation mechanism for low tip speed propeller airfoils. The specific technical objectives of the effort are- (a) to determine the relative effects of upstream turbulence, boundary layer fluctuations and vortex shedding on radiated noise, and (b) to experimentally verify the theoretical prediction models developed under Contract F33615-70-C-1135 and presented in AFAPL-TR-71-55 entitled 'Propeller Noise at Low Tip Speeds'.

The program consists of an experimental effort to determine the relative importance of turbulent inflow, vortex shedding, and boundary layer fluctuations on the radiated acoustic signature from a stationary propeller airfoil in a low velocity free stream. Prediction models presented in AFAPL-TR-71-55 will be verified experimentally. Aerodynamic and acoustic data will be obtained for a stationary airfoil in a quiet jet. The experiments will be conducted in AMRL's anechoic chamber. Correlation techniques will be employed to isolate the regions of maximum noise and to relate local fluctuating pressure to the far- field radiated sound.

Supporting agency address information: AF Aero-Propulsion Laboratory TBC, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0071, COMPRESSOR/TURBINE INSTRUMENTATION AND TRANSIENT ANALYSIS EQUIPMENT
D.L. MCCORMICK, U.S. Air Force, Aero Propulsion Lab., *Dayton, Ohio* 45433

To purchase high response instrumentation and data acquisition and handling equipment for use in the in-house test programs, i.e., T-63 Compressor Stability Investigation, J-85 Control Synthesis Program and adequate building of equipment to meet the needs of the compressor research facility. To maintain a forward-looking evaluation and development program for new instrumentation and sensors for possible use in engine research and development testing.

Determine the instrumentation needs of turbine engine division. Purchase the most compatible equipment, design an operable system, supervise installation in room 17 and prepare Operating Instruction Handbook. Conduct detailed performance tests of critical subsystems as installed and prepare AFAPL TR based on results.

Supporting agency address information: AF Aero-Propulsion Laboratory TBC, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0072, SMOKE DETECTOR FOR CARGO AIRCRAFT
T.M. TRUMBLE, U.S. Air Force, Aero Propulsion Lab., *Dayton, Ohio* 45433

To analyze smoke, design and build an optical smoke detector for cargo aircraft such as the C5A. Protection for baggage compartments and ground facilities will also be considered. A parallel program to develop a spacecraft smoke detector for NASA will also be undertaken.

To use an ultraviolet laser with CW, pulsed and modulated radiation to define the characteristics of smoke most useful for reliable detection. To select sources, sensors, optics and electronics compatible with flight use capable of being integrated into a system.

Supporting agency address information: AF Aero-Propulsion Laboratory SFH, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0073, EVALUATION OF BIODYNAMIC RESPONSES TO ESCAPE SYSTEM AND AIRCRAFT CRASH ENVIRONMENTS

A.G. PHILIP, Univ. of Dayton, Research Institute, *Dayton, Ohio* 45409 (F33615-73-C-4157)

The objective of this program is to provide an efficient means for processing impact data collected on the various AMRL impact research facilities as well as data collected by other government agencies for analysis by the AMRL. The results of the evaluation conducted under this effort will be used by the AMRL to recommend design criteria and set specifications for protective countermeasures to be utilized in the proper design of escape systems and crash protection devices.

Data handled under this program will be analyzed according to conventional techniques and by new methods developed and recommended by the contractor.

Supporting agency address information: 6570 Aerospace Medical Rsch. Lab BB, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0074, FATIGUE LOAD AND LIFE DETERMINATION METHOD FOR ROTARY WING AIRCRAFT COMPONENTS

J.P. RYAN, Univ. of Dayton, School of Engineering, *Dayton, Ohio* 45409 (DAAJ02-74-C-0031)

The objective is to provide a reliable methodology of predicting structural life of rotary wing aircraft components, to determine the dynamic loading parametric factors and relationships that control or effect the structural life of dynamic components and to develop a cost effective method for determining rotary wing aircraft component fatigue life.

A program will be initiated to survey current techniques for translating mission profile into mission load spectra- to survey current mission spectra to identify general technique(s) for obtaining load spectra applicable to design, analysis and testing of rotary wing aircraft- and to survey current methods for obtaining and analyzing fatigue strength data and current practices for calculating fatigue life to develop a cost effective systematic monitoring technique for fatigue critical componets.

Supporting agency address information: AVCOM Eustis Directorate, Air Mobility Research and Development Laboratory, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

1.0075, HIGH TEMPERATURE GENERATOR COMPONENTS DEVELOPMENT

R.C. FEAR, Westinghouse Electric Corp., *Lima, Ohio* 45802 (F33615-72-C-1626)

To determine, investigate and demonstrate solutions to critical problems established in a 5 KVa high temperature program and those involved in expanding high temperature generator technology to higher power levels and densities.

Supporting agency address information: AF Aero-Propulsion Laboratory POD, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0076, SUPERCONDUCTING GENERATOR FOR AIRBORNE HIGH POWER APPLICATIONS

J. PARKER, Westinghouse Electric Corp., *Lima, Ohio* 45802 (F33615-71-C-1591)

Development and test of a lightweight megawatt class superconducting AC generator. The program will demonstrate the feasibility of high power superconducting generators for airborne applications.

The program consists of three phases (1) analyses, preliminary design and critical component test-full scale rotor test, seal tests and superconducting material tests will be accomplished in this phase; (2) extended seal and rotor testing, detail design and machine checkout; (3) Phase III contains performance verification tests; two 24 hour tests of continuous operation at 1 MVa with 0.8 pf lagging and 10 second pulses of 5 MVa. At least 10 pulses will be imposed during each 24 hour run. Duration between pulses will be 1 - 3 minutes.

Supporting agency address information: AF Aero-Propulsion Laboratory POD, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0077, INVESTIGATION OF CH-47C FIXED SYSTEM STALL FLUTTER DAMPING

J.M. BASKIN, Boeing Company, *Philadelphia, Pennsylvania* 19142 (DAAJ02-74-C-0029)

An investigation shall be conducted to determine if the flight envelope of the CH-47C helicopter can be extended by the introduction of viscous damping in the fixed control system. A further objective shall be that the system investigated will be mechanically simple and will not represent a major modification to the present CH-47C system.

The existing CH-47C control system will be evaluated to determine where in the fixed control system the maximum structural deflections occur relative to the airframe. A damper system will be designed, fabricated and installed at this location without alteration to the primary control system structure. Flight test will be performed with and without the damping system operative. Data measurements will be limited to that data necessary for evaluation of the concept. The results will be evaluated to determine the effectiveness of the damping in reducing stall flutter and the related control system loads.

Supporting agency address information: Eustis Directorate, Air Mobility R&D Lab, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

1.0078, HELICOPTER CRASHWORTHY TROOP SEAT TESTING

M.J. REILLY, Boeing Company, *Philadelphia, Pennsylvania* 19142 (DAAJ02-74-C-0036)

The objective of this effort is to (1) test and evaluate the forward- and aft- facing troop seat systems previously designed and mocked-up under Contract No. DAAJ02-C-0077, (2) recommend modifications to the proposed draft General Military Specification entitled MIL-S- XXXX(AV), 'Seat, Helicopter Troop' and USAAMRDL Technical Report 71-22, and (3) deliver to the Eustis Directorate one forward-facing troop seat test article of the approved detail design.

The troop seats of the design(s) developed and mocked-up during Contract DAAJ02-72-C-0077 will be fabricated and subjected to static and dynamic testing to permit publication of a draft military specification for troop seats.

Supporting agency address information: AVCOM Eustis Directorate, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

1.0079, DESIGN, FABRICATION AND LABORATORY TEST OF A HELICOPTER TRANSPORTED CONTAINER HANDLING DEVICE

N. ROTHMAN, Boeing Company, *Philadelphia, Pennsylvania* 19142 (DAAJ02-72-C-0083)

To establish a conceptural designs for a container lift adaptor for use with Army cargo helicopters. The item will provide for quick attachment to Mil-van and commercial shipping containers for transport as an external payload by CH-47, CH-54 and HLH helicopters.

Perform operations analysis to establish characteristics. Prepare conceptural designs. Conduct trade-off study to select

most effective design(s). Fabricate experimental model. Perform laboratory tests and limited flight tests to verify design.

Supporting agency address information: AVCOM Air Mobility R&D Lab, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

1.0080, TURBOJET ENGINE OUT OF AIRFRAME STATIC RUN-UP NOISE SUPPRESSOR
L. KOCIUBA, U.S. Navy, Air Engineering Center, *Philadelphia, Pennsylvania* 19112

Develop a portable noise suppressor adaptable to existing portable turbo-jet engine test stands used by Navy.

Investigate available in-house resources, compile noise-reduction performance and portability requirements and develop plans for contracting to research and develop hardware using Coanda jet deflection and acoustic noise refraction by temperature and velocity gradients in a jet.

Supporting agency address information: Naval Air Systems Command, Washington, D.C. 20361

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0081, COMBAT SAR (SEARCH AND RESCUE) AIR-TO-AIR (SELF-RESCUE) AERCAB (AIR CREW ESCAPE/RESCUE CAPABILITY) SYSTEMS
W.J. BOLLINGER, U.S. Navy, Air Vehicle Technology Dept., *Warminster, Pennsylvania* 18974

Provide ejected aircremen with the capability of extended flight using the ejection seat as an airframe. Maintaining flight after ejection from the primary aircraft in hostile areas is desired to facilitate rescue.

The basic approach to the problem is outlined below. Phase 1 - solicitation of proposals and evaluation of 2 candidate AERCAB concepts. Phase 2 - analytical study-tradeoff analysis. Phase 3 - feasibility testing. Phase 4 - advanced development program based on single concept selected as a result of extended study and testing. Phase 5 - prototype design and engine development. Phase 6 - qualification. Phase 7 - installation in existing aircraft.

Supporting agency address information: Naval Air Systems Command 340B, Washington, D.C. 20361

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0082, TRANSONIC WALL INTERFERENCE STUDIES
T. BINION, Aro Incorporated, *Tullahoma, Tennessee* 37389 (F40600-74-C-0001)

This effort is to establish improved transonic wind tunnel wall porosity schedules for minimizing wall interference effects on lift, drag, and pitching moment simultaneously and to verify and/or develop procedures for further correcting the data obtained at the optimum tunnel conditions. In addition, different wall configurations will be studied.

The wall crossflow characteristics will be evaluated by measuring the local pressure and flow angle near the tunnel wall with a wing model in the test section. Data will be taken throughout the mach number- porosity range of the AEDC Tunnel 1T. The wave cancellation characteristics of a rod wall configuration will be evaluated using an appropriate model and two rod walls /top and bottom/ in tunnel 1T. The rod wall data will be compared to existing perforated wall data taken in tunnel 1T. Previous analytical studies indicate that interference effects on lift, drag, and pitching moment can be reduced simultaneously by varying the porosity axially in the streamwise direction. This analytical work will be verified by testing an aircraft model in tunnel 4T and tunnel 16T.

Supporting agency address information: Arnold Engineering Development Center, Arnold AFS, Tn. 37389

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0083, AERODYNAMIC AND STRUCTURAL LOADS SURVEY OF A HELICOPTER ROTOR DURING OPERATIONAL MANEUVERS
C. COX, Bell Helicopter Company, *Fort Worth, Texas* 76101 (DAAJ02-73-C-0105)

A knowledge of the aerodynamic and dynamic phenomena associated with the operation of a teetering rotor during high speed maneuvers is desired. Accordingly, the immediate objective of this program is to comprehensively instrument and flight test an AH-1G helicopter to acquire the necessary data to quantitatively describe the rotor's operation and the attendent responses of the total vehicle during flight. The description of the vehicle that will be provided by this type data will result in more accurate prediction tools and, consequently, improved design criteria and military specifications. An immediate usage for such data would be in support of the current AAH helicopter development program.

A government furnished helicopter will be extensively instrumented to measure the blade span and chord wise pressures, stresses, and motions and attendent airframe response for various flight conditions, particularly high speed maneuvers. Current instrumentation advances will be utilized to sense the many parameters of data and record these data on magnetic tape in a digitized format. The Bell C-81 computer program will be used to predict various aerodynamic and dynamic loads prior to flight test. These results will then be compared to the actual flight test data.

Supporting agency address information: AVCOM Eustis Directorate, US Army Air Mobility R&D Lab, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

1.0084, FLIGHT TEST OF CARBON SEALS FOR UH-1 TRANSMISSION INPUT QUILL
C. TURNER, Bell Helicopter Company, *Fort Worth, Texas* 76101 (DAAJ02-73-C-0035)

To flight test circumferential carbon seals for UH-1 transmission input quill assembly.

A. Assemble 2 carbon seals in UH-1 quill assembly. B. Green run the assemblies and then install in helicopter. C. Remove from aircraft and inspect. D. Letter report in contractor's format.

Supporting agency address information: AVCOM Eustis Directorate, US Army Air Mobility R&D Lab, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

1.0085, HIGH SURVIVABLE TRANSMISSION, ARMY HELICOPTERS
C. TURNER, Bell Helicopter Company, *Fort Worth, Texas* 76101 (DAAJ02-74-C-0019)

Previous research efforts have etablished the fact that heat dissipation and loss of lubrication present serious problems in the operation of Army helicopter transmissions under combat situations. The objective of this work effort is to prepare a design of an integrated transmission system for the AH-1G/G helicopter that will be capable of operation for 60 minutes after a ballistic damage to the transmission case or lubrication system.

It is planned to utilize the results of previous zero lubrication and thermal mapping of transmission systems, conduct an engineering analysis of the AH-1G/G helicopter transmission, prepare a design of an intergrated main transmission to include a pump and sump pump and demonstrate by test the operational capability of the system after loss of normal lubrication under the best cruise conditions.

Supporting agency address information: AVCOM Eustis Directorate, US Army Air Mobility Research and Development Laboratory, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

1.0086, TEST OF A MODEL OF VISUAL SPATIAL DISCRIMINATION & ITS APPLICATION TO HELICOPTER CONTROL
W.G. MATHENY, Life Sciences Incorporated, *Hurst, Texas* 76053 (DADA17-72-C-2110)

To validate a theoretical model of visual spatial discrimination as related to the visual processes used in the control of pitch, roll, and yaw in helicopter flights- to determine usefulness of this visual mode in such areas as prediction of plot performance- pre-

diction of effect of environmental stress, physiological and psychological factors improved training techniques- and improved console design.

Direct observation and documentation of visual scan patterns followed by data reduction and analysis will provide information to be correlated with an existing theoretical model of visual spatial discrimination. Validated model will be used to develop improved training methods, better instrument groupings, and other appropriate applications.

Supporting agency address information: MDRDC Medical R&D Command, Environmental Protection Research Division, Washington, D.C. 20314

SUPPORTED BY U.S. Dept. of Defense - Army

1.0087, NAVY VEHICLE DESIGN AND CONSTRUCTION - CRASHWORTHINESS OF AIRCRAFT IN WATER IMPACTS

R.C. DEHART, Southwest Research Institute, *San Antonio, Texas* 78228 (N00014-70-C-0265)

Research here is directed toward completion of the definitions of structural crash, stabilization, and design criteria of water crash- landed large Navy helicopter systems. The research will allow optimized weight, strength, performance, design, and evaluation of such systems.

Stabilization of water crash-landed helicopter model at a roll angle near 30 degrees has been achieved by deploying air bags just before impact. The bags, which are initially stowed within a tubular structure extending outwards from simulated sponsons, are presently inflated by nitrogen released from a small, high pressure tank. Future considerations include the use of solid propellant gas generating systems. Further drop tests are planned for various other angles of roll in order to determine the precise roll characteristics and to aid in optimizing parameters such as bag geometry, inflation time and pressure and to forecast the most judicious inflation mechanism.

Supporting agency address information: Office of Naval Research 439, Arlington, Va. 22217

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0088, UNSTEADY SEPARATED FLOW INTERACTION WITH AN AIRFOIL/FLAP COMBINATION

P.A. CHRISTOPHER, Cranfield Inst. of Technology, *Bedford, England, United Kingdom* (AF-AFOSR-2472-73)

AF function - design of aircraft flight control systems. Deficiency - inability to design controls which do not exhibit adverse characteristics of buzz, flutter, and dynamic stall within operating envelope, due to lack of knowledge of causes of these phenomena. Research - the detailed dynamics of unsteady flow/flap interactions will be investigated experimentally and theoretically. A retractable spoiler on an airfoil upper surface will be used to control unsteady separation of the flow. Pressure measurements will be taken in both fixed flap and free flap configurations. The geometry can be varied to 'tune' the flap to resonate at the frequency of the unsteady separation-reattachment cycle. How research contributes - provides the detailed knowledge of unsteady separated flow phenomena needed to complete a theoretical treatment of buzz, flutter, and dynamic stall.

The detailed dynamics of unsteady flow/flap interactions will be investigated experimentally and theoretically. An experiment is planned which involves use of a moveable spoiler on an airfoil upper surface in order to 'control' unsteady separation of flow. Pressure measurements on a flap will be taken with the flap fixed and free-being forced by the unsteady flow. Also various degrees of 'steady' separated flow can be forced by the flap. The purpose of these unsteady measurements is to gain insight into the mechanisms of unsteady separated flow/flap interactions which are presently not well understood. These interactions, however, are predominant in the phenomenon of 'control surface buzz'; furthermore, the phenomena of dynamic stall and stall flutter of airfoils and other lifting surfaces involve similar mechanisms which are also not well understood.

Supporting agency address information: European Office of Aeroapace Research & Development NRE, FPO, New York 09510

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0089, THE OSCILLATION OF LOADS SUSPENDED BENEATH HELICOPTERS

FLOWER, Bristol University, *Bristol, England, United Kingdom* (DAJA37-73-C-0447)

To determine the aerodynamic characteristics of bodies suspended and undergoing prescribed and self-induced oscillations in a wind tunnel, and through theoretical analysis, determine the form and range of unstable regions. This effort is highly relevant to the heavy lift helicopter (HLH) development since the understanding and prevation of load oscillations will improve flight safety as well as increase the forward speed capabilities.

The investigation is in two parts- the first is to experimentally determine the aerodynamic characteristics of representative bodies when undergoing prescribed oscillation in a wind tunnel- the second is to monitor movements of the bodies, while suspended through various means, and allowed to oscillate. The two tests will be tied together through analytical means to predict the form and range of unstable regions. Suppression of unstable oscillations will also be studied.

Supporting agency address information: OCRD European Research Office BOS 15, FPO N. Y. 09510

SUPPORTED BY U.S. Dept. of Defense - Army

1.0090, THREE-DIMENSIONAL TURBULENT BOUNDARY LAYERS 6858-E

F.J. PIERCE, Virginia Polytechnic Institute, School of Engineering, *Blacksburg, Virginia* 24061 (DAHC04-67-C-0008)

To gain a better understanding of three-dimensional turbulent layers and to obtain solutions to the motion equations for strongly skewed flows. A velocity profile of induced velocities of near-surface gas molecules would show a zero velocity for those at the surface with an increasing velocity component as the distance from the surface increased until the free stream velocity was reached. When the free stream velocity is so great that it is strong enough to tear off the surface gas molecules, then we find a turbulent boundary situation where a velocity chaos exists. This kind of work is certainly relevant to the needs of the Army in missile design and development of aircraft helicopters. The three-dimensional boundary layer on rotor blades is an example of an important Army application area.

An experimental and analytical program is planned on the following topics - the measurement of turbulent stress tensors and other turbulence properties in three-dimensional flow environments and over some flow distances to allow the consideration of upstream flow history on these properties, the development of streamwise and transverse shear stress distribution from velocity and pressure field data for these flow environments, the study of suitable mixing length formulations for such flows, starting with an evaluation of the suitability of existing formulations used successfully in two dimensional work, the evaluation of streamwise turbulent shear integrals as used in some integral solutions to this flow problem, and to consider the effect of skew on these integrals, and the solution to the high speed skewed turbulent boundary layer on a helicopter rotor blade utilizing the above findings.

Supporting agency address information: OCRD Research Office Durham, Durham, N.C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

1.0091, HIGH SPEED ROTOR BALANCING 10257-E

W.D. PILKEY, Univ. of Virginia, School of Engineering, *Charlottesville, Virginia* 22903 (DA-ARO(D)-31-124-72-G132)

To develop a new technique for flexible rotor balancing. This study will provide a method of optimizing the balancing of high speed power transmission shafting such as are used in helicopters, gas turbine rotors, and in fact, any drive shafts which may be called on to operate near resonant frequencies. The method is proposed for flexible shafts, but can be applied to rigid systems as well.

(1) implement a linear programming formulation of the balancing problem, (2) formulate and implement other optimization approaches to the classical balancing problem, and (3) conduct a study of the fundamental problem of designing rotating shaft systems such that balancing requirements will be minimized.

Supporting agency address information: OCRD Research Office Durham, Durham, N. C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

1.0092, CONTROLLERS AND AUTOPILOT MODES FOR RPV SIMULATION PROGRAM
C. DIXON, Adaptronics Incorporated, *McLean, Virginia* 22101 (F33615-74-C-4033)

The objective of this effort is to provide the software and/or hardware necessary to simulate various controllers and autopilot modes which may be employed in a variety of remotely piloted vehicle (RPV) missions. The contract will provide lateral and longitudinal autopilot (attitude) modes, altitude hold mode, selection of a bang-bang controller for pitch and roll axis, selection of a proportional rate controller for pitch and roll axis. The work to be accomplished under this contract will make it possible to compare an operator's performance with various controllers, e.g., bang-bang, proportional, adaptive (self- organizing controller), during simulated RPV missions.

The contractor will provide the following autopilot modes for the PDP-12 digital simulation of RPV flight. (1) Augmented-manual attitude mode for lateral and longitudinal control. (2) Augmented-manual rate mode for lateral and longitudinal control. (3) Automatic target homing mode (lateral and longitudinal axis control). (4) Proportional yaw stabilization mode. In addition, the contractor will provide the following controller options: (1) bang-bang controller for pitch and roll axis; (2) proportional controller (position) for pitch and roll axis; (3) proportional rate controller for pitch and roll axis.

Supporting agency address information: 6570 Aerospace Medical Research Lab BB, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0093, COMPUTER AIDED DEVELOPMENT OF AUTOMATED PILOT PROFICIENCY MEASUREMENT TECHNIQUES
E.M. CONNELLY, Quest Research Corporation, *McLean, Virginia* 22101 (F33615-72-C-2094)

This effort is to pursue a computer-aided approach to development of valid and reliable measures of operator performance, and demonstrate the approach by deriving measures and automated measurement techniques for assessing pilot performance in undergraduate pilot training (UPT). Existing methods of assessing flight or simulator pilot performance lack the objectivity, validity, and reliability required for optimum selection and training of pilots and for conducting research in such areas as simulator to aircraft transfer of training. Also, conventional techniques for developing valid measures are too time consuming to be practical in large scale applications. This effort will produce widely applicable computer-aided techniques for deriving valid measures. The techniques will be implemented on the simulation and training advanced research system (start) for use in related in-house research efforts.

Research will include development of mathematical models and associated computational techniques for a computer software system which derives and validates proficiency measures using recorded performance data. This will involve determination of a broad spectrum of measures to be investigated by the software system, development of computational techniques for deriving and validating measures and development and computer implementation of a software system.

Supporting agency address information: AF Human Resources Laboratory ASM, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0094, NAVY ENVIRONMENT - SUPERGRADIENT WIND
E.C. KINDLE, Old Dominion University, Graduate School, *Norfolk, Virginia* 23508 (N00014-72-A-0374-0001)

Operation of Navy high performance aircraft near the sea surface and naval combatants on the sea surface require accurate forecasts of surface winds, so that effective operational planning can be realized. Current atmospheric synoptic forecast models from which surface winds are derived tend to grossly undercast wind speed in regions of strong air/sea thermal gradients. (The anomalous winds in question have been given the name, 'supergradient'). This research is directed toward an improved qualitative and quantitative basis for more accurate surface wind forecasts in regions of strong air/sea thermal gradients.

The contractor will accomplish the second phase of this research by completing the following steps: (1) develop a more comprehensive steady state model, (2) diagnose various coastal winter baroclimic regions to define more precisely the structure of offshore wind belts, (3) conduct a study of winter offshore wind variabilities and regions of cold air offshore flow, (4) initiate development of a time dependent model.

Supporting agency address information: Office of Naval Research 466, Arlington, Va. 22217

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0095, NAVY VEHICLE DESIGN AND CONSTRUCTION - MATHEMATICAL MODELING OF JETS FOR VTOL WINGS IN TRANSITION
J.L. LOTH, West Va. University, School of Engineering, *Morgantown, West Virginia* 26506 (N00014-73-A-0417-0003)

To develop mathematical models for predicting the behavior of hypermixing nozzles and two-dimensional curved exhaust jets for application to VTOL performance analysis. These models will be applied to predict both the internal aerodynamics of VTOL-type augmenters and the aerodynamic performance of an entire wing in transition.

New jet entrainment mathematical models will be devised on the basis of a review and analysis of the most suitable lifting jet mathematical models currently available. Predicted flow parameters such as jet velocity profile, spreading rate, and entrainment rate will be compared with observed experimental data derived from this task.

Supporting agency address information: Office of Naval Research 411, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

ASTRONAUTICS

Includes Astronautics (general); Astrodynamics; Ground Support Systems and Facilities (space); Launch Vehicles and Space Vehicles; Space Transportation; Spacecraft Communications; Command and Tracking; Spacecraft Design, Testing, and Performance; Spacecraft Instrumentation; and Spacecraft Propulsion and Power. For Related Information See Also Aeronautics.

2.0001, LINEAR FILTERING FOR ATMOSPHERIC ENTRY
M.L. SABIN, U.S. Air Force, Frank J. Seiler Res. Lab., *Colorado Springs, Colorado* 80840

AF function - real time control system for reentering space vehicles in support of any of the following AF missions: space transportation, surveillance and reconnaissance. Deficiency - capability for combined estimation of entry-trajectory states and aerodynamic parameters is not sufficient for real time control of maneuvering vehicles in uncertain planetary atmospheres. Research - determination of the ability of a linear Kalman-Schmidt filter to estimate both the states of an entry trajectory and the aerodynamic and atmospheric parameters affecting that trajectory. How research contributes - if feasibility of the proposed method can be shown, the preliminary base for the design of a real time controller will be available. Abstract - the motion of a ballistic or maneuvering vehicle in a planetary atmosphere is governed by highly nonlinear differential equations. That motion is extremely sensitive to the aerodynamic properties of the vehicle, the control forces acting on it and the physical properties of the atmosphere. In an operational environment, or for entry into the atmosphere of a planet other than the earth, precise a priori knowledge of the atmospheric and aerodynamic properties is not available. Information must be derived from on-board and remote tracking measurements which can be processed using an optimal estimation scheme. This research addresses the use of a linear Kalman-Schmidt filter to do a non-real time estimation of both the states of an entry trajectory and the aerodynamic and atmospheric parameters affecting the trajectory. The logical extension of this research is a real-time controller based on the estimates.

Supporting agency address information: Frank J. Seiler Research Lab NH, USAF Academy, Colo. 80840

SUPPORTED BY U.S. Dept. of Defense - Air Force

2.0002, HIGH EFFICIENCY POWER SUPPLIES

R.L. STATLER, U.S. Navy, Research Laboratory, *Washington, District of Columbia* 20390

Increased efficiency and lifetime of satellite power supplies is technically feasible. Immediate improvements can be realized by providing better temperature control for the solar cells and the storage batteries. The objectives for each differ as follows: (1) cool the solar cells to the lowest attainable temperature since efficiency increases inversely with operating temperature. (2) Stabilize the batteries to their optimum operating temperature range throughout the high charge and discharge rates demanded of them.

In both components the need for better thermal conductance to the surrounding satellite structure is needed. This can be achieved by discrete selection and application of interface materials having maximum thermal conductivity and also the necessary electrical resistivity. Heat in the solar cells must be dissipated by high emittance from their covering and adjacent surfaces as well as through conductive or heat- pipe paths to the dark side of the satellite.

Supporting agency address information: Naval Air Systems Command (NAVELEX PME 106-4), Washington, D. C. 20361

SUPPORTED BY U.S. Dept. of Defense - Navy

2.0003, RADIO ASTRONOMICAL AND SATELLITE STUDIES APPLIED TO PROPAGATION

H.E. WHITNEY, U.S. Air Force, Cambridge Research Labs., *Bedford, Massachusetts*

AF function - communications. Deficiency - inadequate knowledge on the transmission of radio waves. Research - investigate ionospheric perturbations caused by solar geophysical phenomena. How research contributes - improves reliability and accuracy of satellite communication and navigation systems. The objective is to study the physical and radio propagation characteristics of radio star and satellite signals being transmitted through the atmosphere and the relation of these characteristics to the reliability and accuracy of satellite communication and navigation systems. By studying the variations of amplitude and polarization of radio waves traversing the ionosphere, the processes which produce both the normal electron density profile and F-layer irregularities can be understood. Multi-station measurements permit latitudinal variations to be compared from the equator to the polar regions using transmissions from synchronous satellites. A comprehensive evaluation of the effects of the aurora, magnetic storms, particle precipitation and sunspot cycle on radio wave propagation through the ionosphere will allow the preparation of synoptic data for system designers. The results are used to determine the effects of amplitude scintillation of communications from synchronous satellites and also the effect of variations in electron content on navigation systems.

Supporting agency address information: AF Cambridge Research Laboratories LI, L. G. Hanscom Field, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

2.0004, SATELLITE NAVIGATION -- AIRBORNE ANTENNA SYSTEM

G.F. VOGT, U.S. Army, Avionics Laboratory, *Red Bank, New Jersey* 07703

In coordination with the user, equipment definition and experiment programs for the defense navigation satellite system (DNSS), and for the operation of a satellite navigation terminal in the Army tactical airborne environment, especially in rotary wing aircraft, an antenna system is to be conceived and designed featuring a radiation characteristic which satisfies the technical performance requirements of the receiving terminal- its use to be limited to a multi-satellite ranging system.

(1) Effect familiarization with the present status of the DNSS and existing antenna concepts through close coordination with SATCOMA, antenna specialists of the USAECOM Technology and Devices Lab, and other participating organizations. (2) Conduct an in-house study in which an evaluation of the pertinent literature is complemented by experiments to establish a model of the specific electromagnetic environment and to determine the electrical characteristics. Problem areas are- transmission perturbations resulting from rotor blade modulation, multipath polarization, and aircraft noise effects. (3) Study conceptual and hardware aspects. (4) Determine tentative design parameters of potential candidates; design, construct and test an exploratory development model. (5) Report results at stated intervals.

Supporting agency address information: ECOM Avionics Lab AMSEL-VL- D, FT. Monmouth, N.J. 07703

SUPPORTED BY U.S. Dept. of Defense - Army

2.0005, TDMA NETWORK AUTOMATION

S.H. TALBOT, U.S. Air Force, Rome Air Development Ctr., *Rome, New York* 13442

The objective of this effort is to derive and evaluate networking procedures for a tactical satellite communications system using the RADC developed time division multiple access technique. It is anticipated that the effort will provide a flexible and efficient method of managing the resources of a satellite communications system. The results will be directly applicable to the tactical Air Force satellite communications system use.

The approach to be taken in fulfilling the objective will consist of a combined in-house and contractual effort. Initially, communications traffic models based on Air Force requirements will be derived in-house while a parallel contractual effort will be pursued to develop networking procedures. The results of the studies will then be experimentally evaluated using experimental TDMA modems and conducting tests over a satellite link. It is also planned to interface a minicomputer with the modem to automate the networking process.

Supporting agency address information: Rome Air Development Center DCC, Griffiss AFB, N.Y. 13440

SUPPORTED BY U.S. Dept. of Defense - Air Force

2.0006, FABRICATIONS AND INVESTIGATIONS OF NICKEL-CADMIUM CELLS FOR AEROSPACE POWER SYSTEMS

D.F. PICKETT, U.S. Air Force, Aero Propulsion Lab., *Dayton, Ohio* 45433

The objective is to acquire an in-house capability for fabrication of Ni-Cd cells, and cell components and to use this capability via innovative experiments to provide improved aerospace Ni-Cd batteries.

The technical approach being followed in this in-house effort is- (a) establish charging efficiency for state-of-the-art cells, (b) establish parameters for a one-step electrochemical loading of electrodes with active material, (c) fabricate 20 cells using electrochemical methods and performance test, (d) repeat (b) and (c) for electrodes made with ultra lightweight plaque (only 10 cells will be fabricated), (e) repeat (c) for 200 cells having various plate additives and constructions.

Supporting agency address information: AF Aero-Propulsion Laboratory POE, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

2.0007, RADAR SCATTERING FROM TURBULENT REENTRY WAKES 9465-E

J. JAREM, Drexel University, School of Engineering, *Philadelphia, Pennsylvania* 19104 (DA-ARO(D)-31-124-71-G72)

To study methods of smoothing the scattering from a turbulent reentry wake. This work is highly relevant to reentry communication, radar ranging and homing-in procedures during reentry. IFF during reentry of a space borne vehicle is impossible due to a plasma cloud surrounding the vehicle thus preventing penetration of any EM radiation from with the cloud or from outside.

Approach - a digital computer statistical program will be used to (1) compute the radar cross section of a re-entry wake for the range of radar frequencies and mean electron densities in the under-dense over- dense transition regime, and (2) compute the

spectrum of bi-static radar cross section of a turbulent re-entry wake including Doppler effects upon the radar cross section.

Supporting agency address information: OCRD Research Office Durham, Durham, N. C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

2.0008, OBSERVATION OF VHF BEACONS ON SATELLITE FE473
K.H. PAI, Natl. Taiwan University, *Taipei, Republic of China* (DACRDAFE S92 544 71 G172)

To make observations of the signals from transmitting satellites. also scintillation percentage, total electron content, irregularity heights and drift velocities will be measured. This work is relevant to Air Force needs inasmuch as it provides background information on fading characteristics which is essential to design of satellite to aircraft and satellite to ground VHF communications systems.

Observations of two phenomena will be used to study the ionosphere - scintillation and Faraday rotation. Scintillation phenomenon is believed to be caused by the ionospheric density fluctuations and hence is useful to study irregularities. The Faraday rotation is caused by the mageto- ionic effect and can be used to deduce the electron content.

Supporting agency address information: OCRD R&D Group-Far East APO, San Francisco, California 96343

SUPPORTED BY U.S. Dept. of Defense - Army

2.0009, STUDY OF THE IONOSPHERE USING TRANSMISSIONS FROM RADIATING SATELLITES
S.J. CARDUS, Observatorio Del Ebro, *Tortosa, Spain* (AF-AFOSR-2168-72)

AF function - communications, radar. Deficiency - communications outages, radar refraction errors and false targets. Research - work measures ionospheric parameters related to solar activity. Data combined with others to form a universal statistical model of ionospheric morphology. How research contributes - results combined to construct fading and total electron content models. This work continues total electron content observation and reduction for the BE-B satellite as well as synchronous satellites of opportunity. The work is performed in collaboration with the Joint Satellite Studies Group.

Supporting agency address information: AF Cambridge Research Laboratories LI, L. G. Hanscom Field, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

2.0010, RPL PLUME ENHANCEMENT PROGRAM
W.K. MCGREGOR, Aro Incorporated, *Tullahoma, Tennessee* 37389 (F40600-74-C-0001)

A gaseous propellant rocket engine plume will be titrated with atomic oxygen and excited N2 and spectral scans made with and without titration at appropriate wavelengths.

The objective is to determine if an enhancement of radiation in the 2.7 microns H2O band and at various wavelengths in the VUV and UV spectral ranges results where atomic oxygen and vibrationally excited nitrogef are titrated into the plume.

Supporting agency address information: Arnold Engineering Development Center, Arnold AF Station, Tenn. 37389

SUPPORTED BY U.S. Dept. of Defense - Air Force

CHEMISTRY AND MATERIALS

Includes Chemistry and Materials (general); Composite Materials; Inorganic and Physical Chemistry; Metallic Materials; Nonmetallic Materials; and Propellants and Fuels.

3.0001, INVESTIGATION AND DEVELOPMENT OF RECOVERY ESCAPE AND SURVIVAL SYSTEMS MATERIAL
J.D. BOONE, U.S. Navy, Aerospace Recovery Facil., *El Centro, California* 92243

To maintain and improve performance, availability, and reliability of materials of survival, escape, and recovery systems, by R&D of currently used and possible substitute materials. Where consistent with performance requirements, to reduce unit cost, number of supply items, and number of specifications. To support, by materials R&D, the work of other units of the facility where failures, poor service life, or unsatisfactory performance of materials occur. To determine safe or useful life; to determine degree, rate, and, where possible, mechanism of material degradation.

Continuous review of literature, specifications, test methods, and innovations in constructions or materials. Implement laboratory programs where failure of old material, promise of new material, or new service requirements, make acquisition of new knowledge necessary.

Supporting agency address information: Naval Air Systems Command 340B, Washington, D.C. 20361

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0002, DEVELOPMENT OF HIGH TOUGHNESS TITANIUM ALLOYS FOR AIRCRAFT STRUCTURES
J.C. WILLIAMS, Rockwell International Corp., *Los Angeles, California* 90009 (N00019-74-C-0273)

To develop a titanium alloy with high yield strength and greatly improved fracture toughness (Kic) for naval aircraft structural applications.

Conduct analysis of twenty compositions varying Mo, Al, Cr, Zr, and V in combination with process conditions. Upscale process using optimum parameters.

Supporting agency address information: Naval Air Systems Command 52031D, Washington, D.C. 20361

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0003, STUDY OF BASIC REINFORCEMENT MECHANISMS IN METAL MATRIX COMPOSITES FOR STRUCTURAL NAVAL AIRCRAFT MATERIAL
T.F. TIETZ, Lockheed Missiles & Space Co., *Palo Alto, California* 94304 (N00019-74-C-0339)

This program involves the study of the basic reinforcement mechanisms in metal matrix composites. The objective is to achieve an optimum combination of properties of all components to achieve a structural aircraft material with high strength, rigidity, toughness and light weight.

Finite element analysis of stresses in metal-matrix composites in thermal and mechanical cycling and creep environments. Relate theoretical analysis to experimental data.

Supporting agency address information: Naval Air Systems Command 52031D, Washington, D.C. 20361

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0004, MATERIAL SUPPORT TECHNOLOGY - PLASTIC SEMICONDUCTORS FOR IMPROVED SENSORS
G.N. SCHRAUZER, Univ. of California, Graduate School, *San Diego, California* 92038 (N00014-69-A-0200-6035)

The Navy is a large user of plastic and rubbery materials in a variety of forms for many important operational functions such as aircraft sealants, protective coatings, adhesives or structural composites. The performance of these materials in each instance is closely coupled to the nature of the polymer from which it is derived. A new family of metal coordination polymers has recently been shown to exhibit good energy absorption characteristics which are under current development for reentry vehicle shielding. It is the purpose of this research to provide new metal containing polymer compositions with unique combinations of properties including high electrical materials, or novel shaped sensors for detection devices.

Original and sophisticated preparative methods are developed and applied to the synthesis of model compounds and polymers containing transition metals coordinatively bonded to unsaturated sulfur containing ligands. Other chemical studies deal with questions of structure, bonding, reactions and particularly the electrical transport and spectral properties of new compositions. Investigations of possible superconducting properties associated with these novel structures will adso be a part of this research.

Supporting agency address information: Office of Naval Research 472, Arlington, Va. 22217

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0005, REFRACTION METHODS FOR PREDICTING PROPERTIES OF VAPORIZED MATERIALS
C.A. FORBRICH, U.S. Air Force, Frank J. Seiler Res. Lab., *Colorado Springs, Colorado* 80840

AF function - identification of reentry vehicles. Deficiency - lack of adequate diagnostic tools for analyzing signatures of reentry vehicles. Research - to assemble data and methods for predicting radiative properties of various atoms. How research contributes - provides identification technique based on radiation intensities of vaporized materials present in wakes of reentry vehicles. Abstract - the hook method is a spectral interferometric technique which is well suited for use with the shock tube for measuring equilibrium and non- equilibrium flow phenomena where refractivity measurements are feasible. In particular, shock tubes can be used to obtain very high temperatures which are sufficient to vaporize most materials, so that a study can be made of their refractivity. Atomic oscillator strengths or F-values can be determined from measurements of the refractivity. Once F-values are known, valuable information concerning the state of a gas can be determined. For example, knowledge of the F-values of iron or chromium permits the determination of the chemical abundance of these elements in the wake of an RV. Knowledge of F-values is required for analyzing the signatures of reentry bodies, such as aerospace craft and ballistic vehicles.

Supporting agency address information: Frank J. Seiler Research Lab NH, USAF Academy, Colo. 80840

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0006, NAVY VEHICLE DESIGN AND CONSTRUCTION - DIRECTIONAL SOLIDIFICATION OF EUTECTIC COMPOSITES
E.R. THOMPSON, United Aircraft Corporation, *Hartford, Connecticut* 06118 (N00014-71-C-0393)

The investigator will vary processing techniques and composition of directionally solidified eutectic alloys to increase their creep strength. Higher temperature capability for eutectics will encourage their use in critical jet engine parts, thereby allowing higher operating temperatures and improved performance in these engines.

The effects of varying composite growth rate, heat treatment, and matrix composition will be evaluated on creep resistance for the eutectic system Ni3Al-Ni3Nb. Five compositions will be used to alter the relative amounts of the phases gamma, gamma prime, and delta. Creep properties will be determined to 1000 degrees C.

Supporting agency address information: Office of Naval Research 471, Arlington, Va. 22217

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0007, EFFECTS OF CURING CONDITIONS AND AGING ON A LOW-TEMPERATURE-CURE EPOXY SYSTEM
J.P. BELL, Univ. of Connecticut, School of Engineering, *Storrs, Connecticut* 06268

Epoxy resins cured with aliphatic amines are very important in applications ranging from household repairs to aerospace components; however, the properties of the cured resins vary with aging and with the curing conditions in a manner which is not understood. Curing time, temperature, and stoichiometry will be used as independent variables to produce samples which will be analyzed for residual reactive groups, dynamic mechanical properties and selected physical properties. The cured samples will then be aged at different times and temperatures, following which the structure will be recharacterized. Attempts will be made to determine the mechanism and extent of the aging process.

SUPPORTED BY U.S. Natl. Science Foundation

3.0008, MEAN FIELD VARIATIONS IN A RANDOM MEDIA 9141-E
J.J. MCCOY, Catholic University of America, Graduate School, *Washington, District of Columbia* 20017 (DA-ARO(D)-31-124-71-G173)

To determine mean field quantities for a statistical sample of heterogeneous media. This study is particularly relevant to the Army's requirement for lightweight materials such as composites which may be used for helicopter structures. In addition, the research should describe the parameters involved in the fracture mechanics of such materials.

Stochastic methods will be used to determine material parameters and provide an analysis which includes crack propagation phenomena.

Supporting agency address information: AMC Army Research Office ARO-D, Durham, N.C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

3.0009, FRACTURE OF BRITTLE MATERIALS
A.G. EVANS, U.S. Dept. of Commerce, Natl. Bureau of Standards, *Washington, District of Columbia* 20234

In this project strength and fracture mechanics techniques are used to elucidate the fracture properties of brittle materials with the goal of providing methods of assuring the reliablity of structural ceramic materials. During the past year we have developed a new technique of assuring reliability of ceramic materials by providing design diagrams for engineers.

Objective: To understand the fracture properties of ceramic materials; and to use this information to provide methods of assuring the reliability of structural ceramics.

Motivation: Because of the extremely brittle nature of ceramic materials and the dependence of the strength of these materials on time, structural designs that use ceramic materials must employ large factors of safety to assure that ceramic components will meet engineering requirements. The requisite of large safety factors results in ceramic components that are heavy and therefore cannot be used in many applications. The development of a technique to reduce this excess weight would permit the use of ceramic materials in new applications such as gas turbines where higher temperatures are needed for greater efficiency.

Approach: Crack growth data obtained by fracture mechanics techniques are used to investigate the physics and chemistry of fractures and to develop design diagrams for structural ceramics. Studies are conducted on a wide range of materials over a range of temperatures (- 196 degrees C to 1400 degrees C) and in various corrosive and inert environments.

Progress: This approach has now been applied to glass, silicon nitride, porcelain and aluminum oxide, and the data from these materials have been used to provide advice to Navy and NASA on proof test levels for porcelain insulators and for the glass windows of the Space Shuttle and Skylab. Studies on glass (in vacuum) and on ceramics at high temperatures have deepened our understanding of fracture mechanisms in these materials.

Plans: Data will be collected for other applications including infrared transmitting zinc selenide windows and refractory ceramics for use in coal gasification plants. A collection of data on zinc selenide will be completed within the current fiscal year undet a contract from the United States Air Force. Data collection on the ceramic coal gasification plants will continue over the next three years under contract by the Office of Coal Research. (Text Abridged)

SUPPORTED BY U.S. Dept. of Commerce - N.B.S.

3.0010, STRUCTURE AND DYNAMICS IN CONDENSED (MAGNETIC AND HYDRIDE) MATERIALS
J.J. RHYNE, U.S. Dept. of Commerce, Natl. Bureau of Standards, *Washington, District of Columbia* 20234

The techniques of elastic and inelastic scattering of thermal neutrons is applied to the study of magnetic materials and other systems of importance in technology. The magnetic systems studied using the NBS reactor facility have concentrated primarily on rare earth materials, both crystalline and amorphous, which have application in the areas of high energy product permanent magnets, computer elements, acoustic delay lines, and magneto-

strictive transducers. The amorphous rare earth compounds represent an important new departure in ordered magnetic materials, one for which this program produced much of the pioneering fundamental investigations. Other research in progress or planning includes a study of the crystal dynamics of beryllium to seek information on its high temperatures ductility transformation, and a study of the behavior of hydrogen in titanium.

Objective: The primary objective of the project is to utilize thermal neutrons from the NBS reactor for elastic and inelastic scattering studies of technologically important magnetic materials. Concentration of effort is placed on rare earth materials and studies include magnetic structures of crystalline and amorphous materials, magnetic excitations, and recrystallization studies of amorphous compounds. These studies are aimed at providing a basic understanding of the processes underlying magnetism in these materials and how they can be adapted to specific technological requirements.

Motivation: The effort is motivated by the continuing requirement of new and impoved magnetic materials in technology and in particular rare earth materials with their inherent large magnetization, anisotropy and magnetostriction which make them feasible for permanent magnets and magnetostrictive transducers in industrial and military applications.

Neutron scattering provides a unique tool to examine the magnetic ordering and excitation processes in solids and provides a bulk (as opposed to surface) probe of the atomic and magnetic moment distributions. This is of particular importance in studying amorphous magnetic materials. The results of the neutron examinations (both magnetic and non-magnetic) leads to fundamental information on static and dynamic properties of materials and provides valuable input to other experiments and theoretical models. (Text Abridged)

SUPPORTED BY U.S. Dept. of Commerce - N.B.S.

3.0011, MECHANICAL PROPERTIES OF COMPOSITES

J.C. SMITH, U.S. Dept. of Commerce, Natl. Bureau of Standards, *Washington, District of Columbia* 20234

Mechanical properties of composites consisting of glass spheres immedded in a glassy or rubbery polymer matrix are being measured. Results of these measurements are used to check various theories predicting the mechanical moduli of particulate composites. Objective: obtain tensile stress-strain and transverse contraction data for strains up to the breaking strain. Obtain these data for composites with glassy matrices and rubbery matrices. Use these data to test existing theories predicting how Young's modulus and Poisson's ratio vary with filler content. Attempt to modify these theories to predict finite-strain behavior. Motivation: A number of theories are available for predicting the small-strain elastic properties of isotropic particulate composites. Accurate experimental data to test these theories is scarce. It is important to test these same theories on composites with different matrix materials, in order to determine if the assumptions underlying these theories are adequate. The background knowledge acquired will eventually be used in perfecting such materials as industrial plastic composites and other systems such as solid rocket fuels. Approach: Epoxy polymers filled with glass beads are tested to determine longitudinal and transverse deformations under tensile stress. Glassy and rubbery epoxy matrices are used, and tests are made at several different temperatures. Progress (Prior FY): A generalized van der Poel theory for calculating mechanical moduli has been published. Experimental data have been obtained on a system of composites with a glassy epoxy matrix. Plans: 1. Publish data on composites with glassy matrix. 2. Obtain data on composites with rubbery matrix. 3. Continue studies of theories predicting mechanical moduli.

SUPPORTED BY U.S. Dept. of Commerce - N.B.S.

3.0012, FRACTURE MECHANICS OF SPACE SHUTTLE WINDOWS

S.M. WIEDERHORN, U.S. Dept. of Commerce, Natl. Bureau of Standards, *Washington, District of Columbia* 20234

This program was started to study the fracture properties of glass for the windows of the Space Shuttle. The program was initiated at the request of Rockwell International Corp. under NASA auspices. In this program, strength measurements and crack velocity measurements were made to characterize the time dependence of the strength of glass. Data so obtained are being used in the design of windows for the Space Shuttle.

Objective: To obtain engineering data that could be used to aid in the design of the Space Shuttle windows.

Motivation. The work was initiated at the request of Rockwell International Corp. (under NASA auspices) who wanted fracture mechanics data on a new glass that was to be used in the Space Shuttle.

Approach: Fracture mechanics type experiments were conducted to characterize crack growth in these glasses as a function of environment, temperature, and applied load. Simultaneously, strength data were obtained on the same glass using center loaded disk specimens whose surfaces were given the same final treatment that would be applied to Space Shuttle glass.

Progress: The crack propagation data was shown to be consistent with the strength data, suggesting that weakening of the space Shuttle glass would occur by crack growth and that the crack growth could indeed be applied for design purposes. Using the crack growth data, design diagrams were obtained which could be used to establish the level of proof test that had to be applied to each pane of glass so that they would fulfill engineering requirements. Upon completion of the project, a report was issued to NASA and the data was submitted for publication.

SUPPORTED BY U.S. Dept. of Commerce - N.B.S.

3.0013, THERMALLY INSENSITIVE GRAVITY GRADIENT RODS

J.A. EISELE, U.S. Navy, Research Laboratory, *Washington, District of Columbia* 20390

Excessive oscillations of satellites employing gravity gradient boom stabilization systems have been attributed to an unexpected warping, or bending, of the boom rods due to thermal differentials in the cylindrical element. Corrective measures must be applied to minimize or compensate this temperature differential.

Efforts will be directed toward changing the thermophysical characteristics of the boom element. The current method is to silver plate the outer surface. The A/E ratio of this coating is about 5, resulting in an equilibrium temperature of several hundred degrees in a normal sun illumination. The approach will be to apply a coating material having an extremely low A/E ratio. Thus, the equilibrium temperature will be much lower and the lower value of a will reduce the temperature gradient around the cylinder. Two promising independent approaches will be used to apply the thermal control coatings.

Supporting agency address information: Naval Air Systems Command (AIR-370H), Washington, D. C. 20361

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0014, MECHANISMS OF FIRE INHIBITION BY CHEMICAL AGENTS

R.G. GANN, U.S. Navy, Research Laboratory, *Washington, District of Columbia* 20390

To determine the mechanisms by which Cf3Br (halon 1301) suppresses fires; to evaluate its role in promoting or quelling the generation of noxious combustion products; to eludicate the conditions under which Cf3Br should be utilized in the habitable compartments of aircraft; and to determine whether a better halogenated agent could be evolved for extinguishing cockpit or other aircraft fires while maintaining a habitable environment.

A fast flow reactor will be used to produce kinetic data on individual reactions between molecular and radical species known to exist in flames. The effect of Cf3Br on reaction rates involving the known flame chain-propagating species will be determined and coupled with existing reaction rate data to construct a fire-suppression mechanism for this agent. This mechanism will be tested by interacting halon 1301 with controlled laboratory flames in the vertical tube reactor and confined combustion chambers. Attention will be paid to the effects of Cf3Br on the generation of noxious combustion products. The information gained from these tests will be used to select and study other fire-suppression agents that might be better suited to the specific demands of fighting aircraft fires.

Supporting agency address information: Naval Air Systems Command (310C), Washington, D.C. 20361

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0015, NAVY VEHICLES AND MATERIALS SUPPORT TECHNOLOGY - THEORY OF DIRECTIONALLY SOLIDIFIED EUTECTIC COMPOSITES
M.E. GLICKSMAN, U.S. Navy, Research Laboratory, *Washington, District of Columbia* 20390

The overall objective is to provide theoretically based guidelines for alloy development and processing needed in practical applications of eutectic materials for naval aircraft. The specific aim at present is to carry out a series of advanced theoretical investigations and develop computer software required to expose the relationships controlling aligned eutectic solidification. The new theoretical results will provide guidelines for delimiting the useful range of aligned eutectics in multicomponent alloys where major technological gains for aircraft engine applications remain untapped, and where the burden of empirical development would be so costly to the Navy.

Novel theoretical techniques were developed recently at NRL to explore diffusion-controlled phase transformations. Modifications of these techniques are used to explore the question of unidirectional eutectic solidification. This new methodology for solving the diffusion equation with non-linear (moving) boundary conditions will be used initially to seek mathematical solutions for steady-state, binary eutectic solidification and develop relationships among critical materials and processing parameters.

Supporting agency address information: Naval Air Systems Command (NAIR-52031B), Washington, D.C. 20360

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0016, ADVANCED HYDROCARBON FUEL DEVELOPMENT
R.N. HAZLETT, U.S. Navy, Research Laboratory, *Washington, District of Columbia* 20390

The purpose of this research is to give a chemical rationale to the complex oxidative and pyrolytic degradation reactions of jet aircraft fuels which afford undesirable products such as varnishes, sediments, and gums in fuel system components. Developments arising from these efforts will aid in defining jet fuel composition and suggesting alternate or improved fuel-handling procedures and materials for fuel system components.

The chemical reactions of hydrocarbon components of jet aircraft fuels are being studied in a flowing system which simulates the heat stress in an advanced aircraft fuel system. The main effort is in the exposure regime associated with short times (seconds), high temperatures (500-1000 degrees F), and limited oxygen availability. The overall chemical reaction schemes are being examined so that the critical processes can be identified and altered, both in the oxidative regime and the pyrolytic regime.

Supporting agency address information: Naval Air Systems Command (AIR-330), Washington, D.C. 20361

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0017, HYDROCARBON FUELS, MICROBIAL DETERIORATION
D.E. KLEMME, U.S. Navy, Research Laboratory, *Washington, District of Columbia* 20390

Microbial contamination of hydrocarbon fuels, hydraulic fluids and lubricants can impair or nullify operation of aircraft, ships and submarines. Recurrent problems caused by these contaminations include clogged filters, instrument malfunction, corrosion and impairment of fuels. The Navy needs more effective, low-cost means for controlling microbes in hydrocarbon materials. Immediate objectives are to prevent development of sulfate-reducing bacteria in fuel tanks and to eliminate growths of various bacteria and fungi associated with JP-5, Navy distillate and marine diesel.

Addition of microbial inhibitors offers promising means of controlling growth of microorganisms associated with oils and fuels. Samples sent from Navy ships and shore installations offer a means of monitoring field problems and serve as sources of organisms for evaluation of preventive measures. Biocidal substances are assayed in small laboratory tests; selections from these assays are re-evaluated in larger systems.

Supporting agency address information: Naval Ship Systems Command (NAVSEC 6101F), Washington, D.C. 20362

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0018, QUANTUM STUDIES OF REACTIVE SCATTERING 9751-C
J.C. LIGHT, Univ. of Chicago, Graduate School, *Chicago, Illinois* 60637 (DA-ARO(D)-31-124-71-G170)

To develop methods to treat quantum mechanical scattering of atoms and diatomic molecules on electronically adiabatic potential energy surfaces. The results emmanating from these fundamental investigations in chemical dynamics have potential application to several Army programs which involve gas phase reaction kinetics including laser, ignition, propulsion and combustion.

Two and three dimensional problems of reactive scattering of H plus H2 (and isotopic analogues) and other simple reactive systems will be studied. Cross sections to the various internal energy states and the angular distributions of the products will be obtained.

Supporting agency address information: OCRD Research Office Durham, Durham, N.C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

3.0019, MEASUREMENTS OF STABILITY OF PLANE POISEUILLE FLOW OF A VISCOELASTIC FLUID
M. SOKOLOV, Tel Aviv University, *Tel Aviv, Israel* (AF-AFOSR-2464-73)

AF function - design of aerospace equipment involving polymerized fluids. Deficiency - lack of knowledge of the behaviour of viscoelastic fluids, in particular the stability of the flow field. Research - design and construction of an open, two-dimensional inclined plane for Poiseuille flow and its use to observe the effect of viscoelastic properties of polymer additives on the stability of the flow. How research contributes - provides information on the relationship between the growth of flow disturbances and the viscoelastic property J of a fluid, enabling equipment design to be accomplished with more efficiency and reliability.

The first step is to design and construct an open, 2-d inclined plane for Poiseuille flow of a Newtonian fluid, with photographic instrumentation for determining the stability of the flow. The second step is to adjust the viscoelastic property of the fluid by adding varying amounts of a polymer and determine the effect on the stability of the flow. Preliminary theoretical analysis predicts destabilization with the disturbance growth rate proportional to the viscoelastic property, J, of the fluid.

Supporting agency address information: European Office of Aerospace Research and Development NRE, New York, N. Y. 09510

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0020, 400 DEGREE ELECTRICAL POTTING COMPOUND
H.J. BOOTH, U.S. Navy, Chemistry Research Department, *Silver Spring, Maryland* 20910

To investigate the high temperature (400 degrees F range) properties of a newly developed electrical potting compound and to modify this system if necessary to improve its high temperature properties.

Establish high temperature capability of a new potting compound by time-temperature-property relation (activation energy of degradation of mechanical and electrical properties). Specify processing conditions.

Supporting agency address information: Naval Air Systems Command (AIR-52032), Washington, D.C. 20361

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0021, STRUCTURE-PROPERTY RELATIONS IN POLYMERS
B. HARTMANN, U.S. Navy, Chemistry Research Department, *Silver Spring, Maryland* 20910

Establish unifying concepts in polymer physics that relate the chemical and physical structure of polymers and composites to their bulk properties. Use these concepts to predict materials behavior under long- term loading, severe environments, shock loading, and other conditions typically required of Navy mines, torpedoes, submarines, ammunition, missile reentry bodies, etc.

Specific heat: Determine specific heats in the differential scanning calorimeter over broad temperature ranges extending from as near absolute zero as possible to about 500 degrees C. Acoustic properties: Relations will be sought between sound absorption, as a function of temperature, and polymer parameters such as molecular configuration, polymer chemistry, glass transition temperature, and molecular weight distribution. Mechanical spectroscopy: Determine modulus and damping characteristics of plastics over a wide temperature range, essentially at a frequency of 1 Hz using a torsional pendulum and a torsional braid analyzer. Transitions in the polymers will be determined as a function of polymer structure and molecular weight.

Supporting agency address information: Office of Naval Research, Chemistry Division (Code 472), Arlington, Va. 22217

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0022, RAIN AND ICE EROSION MODELING

M. KRUMINS, U.S. Navy, Ballistics Department, *Silver Spring, Maryland* 20910

To determine the erosion characterisitics of re-entry nose-tip and heat-shield materials at various flight velocities and pressures. The data will be used to evaluate various erosion prediction methods.

The test materials will be mounted on the forward portion of range models and launched in the NOL 1000-foot hyperballistics range through simulated ice and rain fields. By varying the size and the spacing of the particles on the screens and by proper distribution of the screens along the length of the range, the desired cloud density will be simulated. The launch velocity and range pressure will be varied to obtain the desired flight conditions. The erosion rate will be determined by comparing high resolution in-flight photographs of the material before and after encountering the erosion fields. The temperature of the material surface will be measured optically during the flight.

Supporting agency address information: Defense Nuclear Agency SPAS, Washington, D.C. 20305

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0023, STUDY OF GAS PHASE IGNITION MECHANISMS WITH SKIMMING TRANSIENT MASS 10511-C

K. JAKUS, Univ. of Massachusetts, School of Engineering, *Amherst, Massachusetts* 01002 (DA-ARO(D)-31-124-72-G142)

To contribute to the knowledge of basic ignition mechanisms of solid propellant oxidizers. The proposed research has the potential of supplying information fundamental to the basic understanding of ignition processes which are of high relevance to the Army's programs in interior ballistics, rocket and gun propellants, and explosives.

Temporal variation of relative concentrations of species present in actual ignition processes will be measured with the herein described skimming transient decomposition and thermal explosion of ammonium perchlorate.

Supporting agency address information: OCRD Research Office Durham, Durham, N. C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

3.0024, HIGH TEMPERATURE PROPERTIES OF EUTECTICS AND DIRECTIONALLY SOLIDIFIED ALLOYS FOR POTENTIAL ARMY AIRCRAFT ENGINES

P.J. AHEARN, U.S. Army, Materials & Mechanics Res. Ct., *Watertown, Massachusetts* 02172

High temperature materials are required for a number of Army applications which must show high strength and long time microstructural stability. Ease of fabricability of large sections is often a second criterion. Properly chosen eutectic alloys, may provide the optimum turbine blades and vanes.

High strength castings of eutectic alloys will be prepared. Mechanical properties of eutectics are influenced by the solidification parameters. Currently, properties are optimized by rapid cooling in combination with directional solidification. This procedure has practical limitations and thus experiments will be conducted to develop an alternate technique. Major emphasis will be placed upon artifical means of modifying the diffusion layer in the liquid at the liquid-solid interface. This can be accomplished by producing a controlled liquid flow so the liquid solid interface during directional solidification. Successful alteration of the diffusion layer could result in very fine eutectic phase spacing and high tensile strength in the cast metal.

Supporting agency address information: AMC Materials & Mechanics Research Center, Watertown, MS. 02172

SUPPORTED BY U.S. Dept. of Defense - Army

3.0025, NDT ASSESSMENT OF DIFFUSION BONDED TITANIUM AIRCRAFT COMPONENTS

R.H. BROCKELMAN, U.S. Army, Materials & Mechanics Res. Ct., *Watertown, Massachusetts* 02172

The purpose of this project is to continue the development of nondestructive test methods for the inspection of diffusion bonded titanium alloy aircraft structures. This work is needed to effectively support the quality control program of aircraft components.

Efforts will be concentrated on further development and evaluation of the ultrasonic technique determined in prior years' work to be the most effective for inspecting the diffusion bond interface. The applicability to aircraft components fabricated by the diffusion bonding process will be examined and specific test parameters will be established.

Supporting agency address information: AMC Materials & Mechanics Research Center, Watertown, MS. 02172

SUPPORTED BY U.S. Dept. of Defense - Army

3.0026, FATIGUE AND FRACTURE OF TITANIUM AIRCRAFT ALLOY FORGINGS

T.S. DESISTO, U.S. Army, Materials & Mechanics Res. Ct., *Watertown, Massachusetts* 02172

The objective of this program is to determine the processing history and microstructure required to provide the optimum combination of fatigue resistance and fracture toughness of titanium alloys in heavy section form for helicopter rotor hub and driveshaft applications. Helicopter rotor hubs and driveshafts are fatigue critical components and are subject to fretting; when combined with fatigue loading, can result in a drastic decrease in the life of helicopter components. Materials subjected to press fits, bolted or riveted joints, and, connnections subjected to small oscillatory motions are likely candidates for fretting.

Fatigue crack initiation, fatigue crack propagation and fretting corrosion data will be obtained on titanium alloys subjected to various heat treatments and process variables. The data obtained will be correlated with fractographic features, fracture toughness, mechanical properties and microstructure.

Supporting agency address information: AMC Materiels & Mechanics Research Center, AMXMR-RM, Watertown, MS. 02172

SUPPORTED BY U.S. Dept. of Defense - Army

3.0027, THERMAL MECHANICAL WORKING OF ELECTRON BEAM WELDED JOINTS

P.J. DOYLE, U.S. Army, Materials & Mechanics Res. Ct., *Watertown, Massachusetts* 02172

A reliable technique is needed to join wrought components and retain parent metal properties. The current methods of diffusion bonding represents a serve non-destructive testing problem. This is especially true in aircraft applications such as rotor hubs, spar and fittings.

Electron beam welding of titanium alloys followed by sufficient plastic deformation is one solution to the problem. The technique which was developed on test specimens will be tested on an actual part in a closed die system. The part selected will simulate a rotor hub and will be fully evaluated by both destructive and non-destructive testing.

Supporting agency address information: AMC Materials & Mechanics Research Center, Watertown, MS. 02172

SUPPORTED BY U.S. Dept. of Defense - Army

3.0028, BEHAVIOR OF CASE HARDENED GEAR MATERIALS
P.J. FOPIANO, U.S. Army, Materials & Mechanics Res. Ct., *Watertown, Massachusetts* 02172

The objective of this program is to study the fatigue and fracture behavior of new and improved case hardened materials used in the manufacture of high performance gears for Army aircraft and armored vehicles. Of prime interest are materials that have a high hot-hardness that will minimize the effects of scuffing that occur during metal-to- metal contact as a result of lubrication breakdown. Improvements will be sought in the residual life of these case hardened materials by optimization of metallurgical structure through control of carburizing and heat treatments procedures.

Case hardenable gear materials for high speed applications will be evaluated in terms of composition, phase stability, microstructure, surface structure, and case development. The fatigue and fracture problem will then be studied using modern concepts of fracture mechanics as applied to crack growth during fatigue for selected alloys. Possible correlations of the various physical and mechanical properties with gear performance will be considered.

Supporting agency address information: AMC Materials & Mechanics Research Center, Watertown, MS. 02172

SUPPORTED BY U.S. Dept. of Defense - Army

3.0029, HIGH TEMPERATURE STRENGTHENING OF TITANIUM ALLOYS
R.D. FRENCH, U.S. Army, Materials & Mechanics Res. Ct., *Watertown, Massachusetts* 02172

To extend the development of high temperature titanium alloys. Specific objectives are- (1) to improve the mechanical properties (i.e. strength, creep resistance) of titanium alloys at temperatures to 1200 degrees F; (2) to determine the diffusivities of alloying elements in alpha titanium, and (3) to determine the high temperature fatigue resistance of an alpha/beta alloy and one or more alpha alloys. This project is directed toward the resolution of problem area 12.2 of the Materials Technology Plan for Aircraft guidance for FY74.

Based on information gained from a continuing study of the high temperature deformation of titanium-aluminum alloys, the first specific objective will be accomplished by changing alloy content and microstructure to take all possible advantage of structural resistance to high temperature deformation. The second specific objective will be accomplished by measuring diffusivities of alloying elements in alpha titanium as a function of temperature by anelastic relaxation. The third specific objective will be accomplished by mechanically fatiguing titanium alloys at temperatures between 800 degrees F and 1200 degrees F.

Supporting agency address information: AMC Materials & Mechanics Research Center, AMXMR-RM, Watertown, MS. 02172

SUPPORTED BY U.S. Dept. of Defense - Army

3.0030, APPLICATION OF ACOUSTIC EMISSION TO FAILURE MODES IN METAL MATRIX COMPOSITES
A.F. GRENIS, U.S. Army, Materials & Mechanics Res. Ct., *Watertown, Massachusetts* 02172

The technical objectives are to utilize acoustic emission techniques for evaluating metal matrix composites suitable for use in aircraft housings- and also to perform analytical studies pertaining to composite strength characteristics and composite failure mode characteristics. Recently, ultrasonic sounds emitted by materials under load have been used in other laboratories to study microcracking in metals and in composites. The rate and total count of emitted ultrasonic pulses offer a means for evaluating new composite materials.

Analytical studies of fiber fracture characteristics of fiber reinforced composites will be expanded. Also, the failure mechanism of composites (such as aluminum and magnesium matrices with carbon or boron fibers) will be investigated utilizing mechanical tensile test methods and acoustic emission techniques. These studies will include composites currently being developed. Equipment for acoustic emission measurements will be employed- and techniques for the recording of relevant sounds of the different composites will be developed as needed. The development of fiber composites having preferred or improved properties, as well as the fabrication of composites having uniform properties, would be dependent on the above considerations.

Supporting agency address information: AMC Materials & Mechanics Research Center, Attn- AMXMR-EM, Watertown, MS. 02172

SUPPORTED BY U.S. Dept. of Defense - Army

3.0031, DEVELOPMENT OF HIGH STRENGTH TITANIUM ALLOYS
C.F. HICKEY, U.S. Army, Materials & Mechanics Res. Ct., *Watertown, Massachusetts* 02172

The objectives of this program are (1) enhance the properties of experimental and commercially available titanium alloys by techniques such as a thermomechanical treatments and stress induced transformations and (2) develop new classes of titanium alloys using ternary and complex alloying constituents. Because of numerous favorable characteristics of the beta titanium alloys (ease of fabricability, high hardenability, and high toughness), they are currently being used and proposed for additional use in Army aircraft. Further mechanical property enhancement for these materials would result in greater payload capabilities, thus leading to increased component operational efficiency, reliability, and integrity. This program is directed toward the resolution of problem areas 5.7, 6.2, 11.6 and 22.1 of the materials technology plan for aircraft and problem area 11 of the materials technology plan for armaments.

Several techniques are available for increasing the strength of titanium alloys including heat treatment, mechanical working, alloying, and combinations of these. The major effort of this program is to modify the alloy chemistry, the thermal and mechanical processing, and combinations such that optimum combinations of strength and ductility can be achieved. The microstructure and phase transformations of these alloys will be characterized by micrography and x-ray techniques.

Supporting agency address information: AMC Materials & Mechanics Research Center, Watertown, MS. 02172

SUPPORTED BY U.S. Dept. of Defense - Army

3.0032, DEVELOPMENT OF DUCTILE HIGH STRENGTH POWDER ALUMINUM ALLOYS
W. MALATESTA, U.S. Army, Materials & Mechanics Res. Ct., *Watertown, Massachusetts* 02172

Research objectives of the FY75 program are to define metallurgical and deformation variables necessary for developing 100,000 psi minimum transverse yield strength values in powder metal aluminum alloys.

Aluminum alloy powders utilized as base metals for this task will consist of modified 7xxx type alloys. The microquenched powders will be subjected to various degassing treatments involving moderate temperatures and high vacuum atmospheres. The influences of controlled material and extrusion variables such as degree of powder compacting, powder size, hydrogen content, processing time-temperature relationships, reduction ratio and post-extrusion thermal treatments upon metallurgical factors controlling development of engineering property in fabricated components will be evaluated using optical microscopy, tensile, hardness, notch tensile and 'v' notch Charpy testing procedures.

Supporting agency address information: AMC Materials & Mechanics Research Center, Watertown, MS. 02172

SUPPORTED BY U.S. Dept. of Defense - Army

3.0033, PARTICULATE DISPERSION CERAMIC COMPOSITE MATERIALS
J.W. MCCAULEY, U.S. Army, Materials & Mechanics Res. Ct., *Watertown, Massachusetts* 02172

The optimum operation of many Army hardware systems require materials with properties not available in currently available single component materials. In particular material limitations in applications such as armor to defeat shaped charges, turbine engine components, bearings, tool bits, structural heat shields and structural radar windows could be eliminated by the use of particulate dispersion composites-microcomposite materials with a discrete second phase homogeneously dispersed in another. The objective of this program is to enhance and control the properties of currently used and potentially usable ceramics.

It is proposed to meet this objective by investigating the fabrication of particulate dispersion composites consisting of synthetic fluorine silicates (micas and fibers) and selected ceramics (alumina and mullite), metals and polymers. Criteria will be established so that the technology can be transferred for used with other combinations of components. Fabrication will be followed by in-depth characterization, engineering property evaluation and simulated or actual utilization tests.

Supporting agency address information: AMC Materials & Mechanics Research Center, Watertown, MS. 02172

SUPPORTED BY U.S. Dept. of Defense - Army

3.0034, ELECTRONIC STRUCTURE AND CHARACTERIZATION OF MATERIALS BY NMR

P.L. SAGALYN, U.S. Army, Materials & Mechanics Res. Ct., *Watertown, Massachusetts* 02172

(1) Lead telluride and lead-tin-telluride are important materials for infrared generation and detection. Further characterize their band structure by NMR. (2) Beryllium and its alloys, with transition metals, and boron compounds, have important potential applications for lightweight armor, for aircraft, and for composite materials. Characterize these materials via NMR, both for quality assurance and for gaining understanding that will lead to improved materials.

Determination and interpretation of NMR spectra, Knight shifts, spin-lattice relaxation times, and (as appropriate) quadrupolar couplings. In the lead salts and their alloys this will be a function of carrier concentration and temperature. In boron compounds, this will be a function of temperature as appropriate. Primary emphasis will be given to work on the lead salts.

Supporting agency address information: AMC Materials & Mechanics Research Center AMXMR-RS, Watertown, MS. 02172

SUPPORTED BY U.S. Dept. of Defense - Army

3.0035, ESTABLISHMENT OF MOST COST EFFECTIVE MATERIALS & PROCESSES FOR TURBINE COMPONENTS

P.R. SMOOT, U.S. Army, Materials & Mechanics Res. Ct., *Watertown, Massachusetts* 02172

The Army requires turbine engines for observation helicopters, fixed wing aircraft, auxiliary power units, vehicles, etc. It is desired that these engines have low specific fuel consumption, high specific power, and simplicity. The cooled radial turbine will provide the desired characteristics. The objective is to establish the most cost effective method of fabricating the turbine. The potential cost reduction is $70 million.

The bi-casting process for rotor fabrication will be developed. Castings with a low mold and melt temperature and a high mold and melt temperature have been made. Additional castings will be made with intermediate combinations of mold and metal temperature and evaluated. Fugitive braze alloy may be used. The integral casting process will be investigated. The castings will be bottom gated and a choke used. Castings will be evaluated and the most cost effective process selected.

Supporting agency address information: AMC Materials & Mechanics Research Center, Watertown, MS. 02172

SUPPORTED BY U.S. Dept. of Defense - Army

3.0036, STRUCTURAL MATERIALS WITH DAMPING CHARACTERISTICS

R.J. WEISS, U.S. Army, Materials & Mechanics Res. Ct., *Watertown, Massachusetts* 02172

(A) To investigate the fundamental atomic mechanism of vibrational damping in such materials as nitinol (tini), Cu3Al MnCu and Fe3Pt in order to be able to predict other systems that might show damping characteristics. (B) To produce a viable structural alloy with high damping for use in reducing helicopter transmission noise.

Simultaneous physical properties such as specific heat, resistivity, elastic constants, soft vibrational modes, optical properties will be measured as a function of temperature and correlated to the damping. The effect of metallurgical treatment on the strength and damping will be examined.

Supporting agency address information: AMC Materials & Mechanics Research Center, Watertown, MS. 02172

SUPPORTED BY U.S. Dept. of Defense - Army

3.0037, METAL AIRFIELD LANDING MATS

D.W. WHITE, U.S. Army, Waterways Experiment Station, *Vicksburg, Mississippi* 39180

To improve the load-carrying capability of soils through the use of load-distributing landing mat panels as expedient surfacing materials for military purposes. Determine what materials and designs are suitable. Evaluate performance of different landing mat designs under various aircraft loading conditions.

Select and/or design suitable items of expedient surfacing materials for testing. Conduct physical, chemical, and mechanical tests in the laboratory to determine strength and durability of materials. Specially constructed rolling load carts are used to apply accelerated traffic in testing landing mats under various wheel loads and subgrade conditions. Problems encountered are (1) irregularities in design and fabrication, (2) accurate determination and maintenance of subgrade strengths, and (3) lack of precise failure criteria.

Supporting agency address information: OCE Waterways Experiment Station, Vicksburg, Mi. 39180

SUPPORTED BY U.S. Dept. of Defense - Army

3.0038, NAVY ENVIRONMENT - FRETTING FATIGUE DAMAGE OF AIRCRAFT STRUCTURAL MATERIALS

D.W. HOEPPNER, Univ. of Missouri, Graduate School, *Columbia, Missouri* 65202 (N00014-67-A-0287-0005)

The objective of this research is to determine the causes and failure mechanisms associated with fretting corrosion and fretting fatigue damage of aircraft structural alloys.

The investigator is undertaking a study of the manner in which fretting damage influences fatigue life of the fretted materials. The materials to be studied are Ti-6Al-4V alloy and 7075-T6 aluminum alloy. Variables to be assessed are: fatigue load, normal load, surface finish and surface material. Surface damage is to be ascertained by scanning electron microscopy and conventional metallurgical techniques. The establishment of the physical processes that lead to the initiation of fretting-fatigue damage is sought.

Supporting agency address information: Office of Naval Research 471, Arlington, Va. 22217

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0039, INFRARED LOW EMITTANCE CATALYTIC COATINGS FOR AIRCRAFT ENGINE INFRARED SUPPRESSION DEVICES

R. LANGLEY, Engelhard Ind. Incorporated, *New Providence, New Jersey* 07974 (DAAJ02-73-C-0078)

To reduce the vulnerability of its aircraft, the Army has developed infrared emission control coatings to enhance the effectiveness of aircraft engine IR supression devices. Tests have shown that coated internal surfaces of these devices that operate at low temperature become coated with soot precipitated from the exhaust gases which increases the emissivity of these surfaces and thus reduces the effectiveness of the suppression device. This research program will investigate oxidation promoting catalytic material to determine if incorporating this material in the coating will result in a coating system suitable for Army aircraft engine IR suppressor application.

Two basic techniques will be investigated. One will be to investigate the feasibility of a catalytic coating applied in conjunction with the existing coating system. The other approach will be to determine the feasibility of combining into one material coating application the low emittance and catalytic function.

Supporting agency address information: AVCOM Eustis Directorate, US Army Air Mobility R&D Lab, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

3.0040, EVALUATION OF ACOUSTIC EMISSION FROM REVERSIBLE ACOUSTIC STRESSES USING PHASE SENSITIVE METHODS 10350-MC

D.N. BESHERS, Columbia University, School of Mines, *New York, New York* 10027 (DAHC04-74-G-0118)

To evaluate the acoustic emissions generated during processes of plastic deformation and fracture through employment of well-established techniques for processing of signals, in particular the method of phase- sensitive detection. Relevance: A wide range of practical extensions of the proposed research exist in the field of non-destructive testing. Of greatest significance is the possibility of detecting incipient cracks in munitions, in armament, and in critical sections of aircraft that are susceptible to damage in fatigue.

Emphasis is to be placed upon the region of low-level emissions, especially those produced under repeated loads, in attempts to correlate such emissions with movement of dislocations, with features of microstructure, and with mechanical properties of materials ranging from yield stress and variation of flow stress with strain-rate and temperature through fatigue behavior.

Supporting agency address information: OCRD Research Office Durham, Durham, N. C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

3.0041, FUELS AND LUBRICANTS RESEARCH CONSULTANTS

M.K. MCLEOD, Coord. Research Council Inc., *New York, New York* 10020 (DAAD05-68-C-0068)

Assists AMC in carrying out investigative programs and performing research on all types of fuels, lubricants and related material and equipment. Provide a forum for the various segments of the automotive and petroleum industries to work together in noncompetitive problem areas.

Approach - establish advisory groups and panels in those areas where a broad range of knowledge and experience will be helpful and impossible to maintain as an inhouse capability. These are formed by drawing engineers and scientists from the automotive and petroleum industries who cooperate with the CRC. The latter administers and coordinates the programs. Work is divided into four major categories: (1) special, (2) aviation, (3) diesel vehicle, (4) motor (gasoline) vehicle.

Supporting agency address information: AMC Coating & Chemical Lab, Aberdeen PG, Md. 21005

SUPPORTED BY U.S. Dept. of Defense - Army

3.0042, DEFORMATION OF DUCTILE TWO-PHASE ALLOYS 5640

H. MARGOLIN, New York University, School of Engineering, *New York, New York* 10453 (DA-ARO(D)-31-124-73-G75)

To determine the factors significant in bi-alloy bi-and tricrystal deformation behavior. The determination of the mechanisms of transfer of stress across phase boundaries (and grain boundaries) of polycrystalline materials is important from the standpoints of strength and fracture. The information gained should be applicable to selection of alloys and heat treatments (in titanium alloys) for helicopters, armored vehicles and engine components.

Various orientations of bicrystals are to be subjected to compression loading. Stress-strain relations are to be determined, and the interrelation of deformation in the two halves of the bicrystal will be studied. The behavior of a soft phase in a ductile matrix will be simulated by the response of sandwiches of an alpha crystal between two beta crystals of the same orientation. The stress-strain behavior will be studied as a function of the size of the alpha layer in the sandwich.

Supporting agency address information: OCRD Research Office Durham, Durham, N. C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

3.0043, ELECTRON SPIN RESONANCE STUDIES OF PI-ELECTRON FREE RADICALS 10607-C

G. VINCOW, Syracuse University, Graduate School, *Syracuse, New York* 13210 (DA-ARO(D)-31-124-72-G61)

Objective - investigation of free radicals produced thermally and by x-irradiation. A better understanding of their chemical behavior, e.g. envisaged by the proposer, should have important implications in the field of organic semiconductors, plastics, and oxidizers for propellants, all of which are related to free radical chemistry and are of great potential importance to the Army.

Approach - (a) a number of important new free radicals will be produced by 50 kv x-irradiation of single crystals of organic compounds. The isotropic and anisotropic ESR hyperfine spectra of these oriented free radicals will be measured and correlated with valence theory calculations of the electronic structure. Primary processes of radiation damage will be investigated. (b) Three systems will be studied in which free radicals are generated thermally. (1) ESR of cycloheptatrienyl and substituted cycloheptatrienyl radicals, (2) ESR of the fluorosulfate free radical (So3F) in solution, and (3) ESR and thermochromism of a series of compounds related to delta -10,10'-bianthrone.

Supporting agency address information: OCRD Research Office Durham, Durham, N. C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

3.0044, DESIGN AGAINST FATIGUE FAILURE 9699-E

V. WEISS, Syracuse University, School of Engineering, *Syracuse, New York* 13210 (DA-ARO(D)-31-124-72-G136)

To increase the understanding of fatigue failure in materials. Relevance - this study has a high probability of furnishing valuable design data which should result in improved helicopter structures subjected to extreme vibratory environments.

An experimental and analytical study will be made to determine the conditions that control (1) prevention of initiation of fatigue cracks from notches and other geometrical stress concentrators and (2) the arrest of existing fatigue cracks.

Supporting agency address information: OCRD Research Office Durham, Durham, N. C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

3.0045, PERFORMANCE OF SELECTED FABRICS TREATED WITH FLAME RETARDANT FINISHES

P. KEENEY, Univ. of North Carolina, School of Home Economics, *Greensboro, North Carolina* 27412 (NC00086)

Objective: Determine in a specially constructed test chamber the effects of air velocities on the burning characteristics of single and multilayer arrangements of fabric combinations utilized in Objective I.

Approach: Selected fabrics (untreated and flame resistant) will be burned in quiescent atmospheric conditions according to standard procedure. The same fabrics will be burned in three different velocities of air to determine effectiveness of retarding treatments. The same fabrics will be burned with multilayers of fabrics representing burning of outer apparel with undergarments. Significant differences in variables will be tested using analysis of variance.

Progress: Fabrics and undergarments have been sampled and multilayer test assemblies prepared for burning in quiescent and in moving air, using a vertical strip method and specially constructed instrument. Results of testing in progress indicate that a second layer of fabric can affect the burning characteristics. Flame retardant finishes on one layer do not eliminate the hazard from the burning second layer. Increase in air velocity tends to 'spread' the flame. Variations in air velocity appear to produce varying burning characteristics. The highest velocity of air does not result in the greatest flame damage.

SUPPORTED BY U.S. Dept. of Agriculture - C.S.R.S.

3.0046, HIGH ENERGY NITROGEN COMPOUNDS 10368-C

G.A. OLAH, Case Western Reserve Univ., School of Arts, *Cleveland, Ohio* 44106 (DA-ARO(D)-31-124-72-G157)

To prepare high energy nitrogen compounds. The high energy nitrogen compounds to be prepared are either known or potential detonators, explosives, and propellants. New synthetic routes may lead, not only to more economical production, but also to significant decrease in environmental pollution associated with their production.

To provide the definitive picture of electrophilic nitration in both aromatic and aliphatic systems. To determine new and efficient preparative routes leading to highly nitrated aromatics, aliphatics, haloaromatics, polynitrates and nitraiines.

Supporting agency address information: OCRD Research Office Durham, Durham, N. C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

3.0047, NAVY ENVIRONMENT - STUDIES OF CORROSION AND PASSIVITY OF ALLOYS AND COMPOUNDS USED IN NAVAL SHIPS AND AIRCRAFT

R.W. STAEHLE, Ohio State University, School of Engineering, *Columbus, Ohio* 43212 (N00014-67-A-0232-0006)

The purpose of this research task is to determine the corrosion mechanisms of selected iron and nickel base alloys in order to provide guidelines for the formulation of more corrosion resistant alloys for naval use.

The corrosion resistance of selected ferrous and non-ferrous alloys is being investigated by means of studies of the dissolution kinetics of the oxides that normally cover and protect their surfaces. In addition, the selective attack of minor phases in steels (e.g., sulphides) and dealloying attack, i.e., the selective leaching of one component of an alloy, is under investigation. Standard electrochemical and analytical techniques as well as auger analyses, ellipsometry and electron microscopy are being used to follow the dissolution processes.

Supporting agency address information: Office of Naval Research 471, Arlington, Va. 22217

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0048, PARAMETERS AFFECTING THE THERMAL STABILITY AND HEAT SINK OF HYDROCARBON AIRCRAFT FUELS

R.P. BRADLEY, U.S. Air Force, Aero Propulsion Lab., *Dayton, Ohio* 45433

The objective of this study is to provide the information necessary for specifying fuels which will be capable of providing cooling and propulsion for engines powering aircraft in the speed range from subsonic to above mach 3. Both conventional and new thermal stability devices will be evaluated with regard to the effect of the following variables on test precision and the significance of results- 1. Pretest filtration - necessity and amount, 2. Dissolved oxygen - level and control, 3. Test pump contributions, 4. Procedural techniques - controlling certain areas, 5. Test preparation and procedure.

The ASTM fuel coker, the jet fuel thermal oxidation tester, and the Minex III will be evaluated with regard to the affect of the following variables on test precision and significance- (1) flow rate variation, (2) test time, (3) dissolved oxygen content, (4) test section metallurgy, and (5) procedural effects. New techniques for interpreting degree of deposition will be investigated including light reflectance, beta ray backscatter, heat transfer degradation, and gravimetric techniques. A thermal stability survey of JP-4 using both the ASTM fuel coker and the jet fuel thermal oxidation tester will establish the basis for incorporating the jet fuel thermal oxidation tester into MIL-T-5624. The small scale studies will be closely coordinated with the advanced aircraft fuel simulator program to establish the significance of the small scale results to engine performance. Standardized fuels of known properties will be preserved in cold storage at 30 and 10 degrees F.

Supporting agency address information: AF Aero-Propulsion Laboratory SFF, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0049, TURBINE ENGINE SEAL TEST FACILITY

M. MCKINNEY, U.S. Air Force, Aero Propulsion Lab., *Dayton, Ohio* 45433

The objective of this program is to evaluate turbine engine seal materials and designs for application in advanced engine configurations. Rub resistance and thermal degradation resistance of new materials will be examined in a small rub test rig. New seal design aerodynamic and thermal properties will be evaluated in a larger test rig. Full scale design data will be obtained from the rig operation.

Design, fabricate and install a seal test rig with a 5 inch (maximum) diameter wheel for materials evaluation. Select a number of current and future materials for evaluation. Design, fabricate and install a large aerodynamic seal test rig capable of testing seal configurations from 5-16 inch diameter.

Supporting agency address information: AF Aero-Propulsion Laboratory TBC, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0050, LUBRICATION, WEAR, AND FATIGUE STUDIES FOR NAVAL AIRCRAFT ENGINE APPLICATION

E. SCHOELER, S K F Industries Incorporated, *Norristown, Pennsylvania* 19406 (N00019-71-C-0425)

To study the effect of lubricant properties on the elastohydrodynamic (EHD) film forming and traction characteristics of fluids for naval aircraft engines.

A broad range of different fluid lubricants will be examined by measuring the lubricating oil film thickness in circular rolling/sliding EHD contracts. The traction force transmitted by the EHD contacts will also be determined. Film thickness and traction will be studied as functions of a number of test variables and of a number of fluid variables.

Supporting agency address information: Naval Air Systems Command 330C, Washington, D.C. 20361

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0051, SERVICES TO DETERMINE RELATIONSHIP BETWEEN OUTDOOR WEATHERING AND ESR SIGNALS FOR AIRCRAFT COATINGS

R.O. HUTCHINS, Drexel University, School of Science, *Philadelphia, Pennsylvania* 19104 (N62269-74-C-0183)

To study and rationalize the deteriorative processes which occur in aircraft coatings on outdoor exposure so that it may be possible to: (a) predict yellowing, chalking and other breakdown patterns based on the coating components, and (b) attenuate these patterns by appropriate formulation measures.

Urethane monomers and polymers per se, and pigmented into coatings, will be subjected to ultraviolet radiation conditions similar to but more intense than subtropical exposures. The course of the photodegradation will be monitored by electron spin resonance (ESR) to identify the coating components which contribute to or detract from exposure life.

Supporting agency address information: Naval Air Development Center, Air Vehicle Technology Dept. 3022R, Warminster, Pa. 18974

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0052, MATERIALS SUPPORT TECHNOLOGY - HIGH STRENGTH COPPER ALLOYS

G.H. MEIER, Univ. of Pittsburgh, School of Engineering, *Pittsburgh, Pennsylvania* 15213 (N00014-67-A-0402-0008)

This research is aimed at developing stable, high-temperature structures and improved strength in copper alloys. Copper alloys with improved high temperature properties could be used in several naval applications including engine parts, radiator fins, welding electrodes, and electrical switches.

A fine dispersion of titanium oxide will be developed in copper- titanium alloys by internal oxidation. Mechanical properties will be determined with respect to the volume percent, size, and spacing of the dispersed oxide phase in both single and polycrystalline copper-titanium alloys. Additions of beryllium and cobalt will be used to vary the precipitate structure.

Supporting agency address information: Office of Naval Research 471, Arlington, Va. 22217

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0053, CATAPULT LOAD CARRYING TAPE MEDIUMS
R.W. BURKHART, U.S. Navy, Air Development Center, *Warminster, Pennsylvania* 18974

Develop unique flat tape load carrying systems for shipboard launch and recovery equipment. Major objective is to establish a tow tape with 650,000 lbs. ultimate design load with a 10,000 launch cycle life.

Search and study latest composite, laminate, and matrix materials, both metallic and non-metallic, and determine applicability using analysis verified by test.

Supporting agency address information: Naval Air Systems Command 53721, Washington, D.C. 20361

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0054, ADVANCED MATERIALS FOR AIRCRAFT AIRFRAMES
W.J. FEDYNA, U.S. Navy, Air Vehicle Technology Dept., *Warminster, Pennsylvania* 18974

To develop materials for lighter weight, higher temperature tolerant airframes. Specific objectives are (1) establish an engineering data base on effects of weathering, aging and corrosion of carbon-epoxy composites in marine and industrial environments. (2) Evaluate fuel tank sealants and structural adhesives for service at temperatures of 450 degree. (3) Develop design parameters on electro-slag remelted 4340 steel and transage 129 titanium alloy.

Graphite-epoxy panels of several types will be exposed for varying periods of time in both tropical marine and industrial environments, and characterized after exposure. Corrosion studies will be conducted on graphite-epoxy composites coupled with titanium and aluminum. Selected structural adhesives and fuel tank sealants will be evaluated for service at 450 degree. Design parameters will be developed for electro- slag remelted 4340 steel and transage 129 titanium alloy.

Supporting agency address information: Naval Air Systems Command 320A, Washington, D.C. 20361

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0055, ADVANCED THIN FILM MATERIALS AND PROCESS RESEARCH FOR NAVAL AIRCRAFT APPLICATIONS
K. GENTNER, U.S. Navy, Air Vehicle Technology Dept., *Warminster, Pennsylvania* 18974

To conduct in-house research in materials and process technology for the development of new functional thin films and protective coatings. Materials and techniques will be geared primarily for application in critical airborne structures. Services will be offered for supplementing other naval programs in critical phases where the unique features of vacuum processed films or coatings can provide information and support not available by other means.

Design desired material compositions through theoretical studies and selective experimental procedures. Establish processes, test and evaluate materials of the most promising characteristics. Apply new materials and processes to advanced devices or structures.

Supporting agency address information: Naval Air Development Center 01, Warminster, Pa. 18974

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0056, DEVELOPMENT OF ADVANCED METAL STRUCTURES FOR NAVAL AIRCRAFT
P. KOZEL, U.S. Navy, Air Vehicle Technology Dept., *Warminster, Pennsylvania* 18974

To exploit the potential of advanced metal alloys for improving aircraft structures by developing design, analysis, fabrication and instrumentation concepts which will result in maximum structural efficiency and reliability at minimum cost. To anticipate structural performance requirements for future Navy air vehicles and to implement technological development toward the timely solution of concomitant problems.

Structural components are fabricated from advanced metal alloys which promise improvements in weight or reliability. New fabrication processes are developed to improve structural quality while reducing the high manufacturing costs presently associated with these alloys. Design details such as joints employing advanced fastening systems are evaluated in the laboratory. Recommendations to direct developmental work in aeroelasticity, structural dynamics and design of structures for high temperatures will be obtained from authorities in these fields and correlated with Navy requirements. Fatigue reliability is addressed in a program to develop an airborne strain level counter (auto-logger) and a low-cost, bonded fatigue sensor.

Supporting agency address information: Naval Air Systems Command 320B, Washington, D.C. 20361

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0057, FRACTURE MECHANICS AND CRACK PROPAGATION HYPOTHESES FOR NAVAL AIRCRAFT STRUCTURES
P.A. KOZEL, U.S. Navy, Air Vehicle Technology Dept., *Warminster, Pennsylvania* 18974

To evolve engineering hypotheses for use in determining the residual strength, fracture resistance and crack growth behavior in structures as a means of ensuring the structural integrity of naval aircraft.

Analytical and experimental work will be performed to investigate the influence of parameters such as thickness, width, crack aspect ratio and mean and alternating stresses on residual strength and crack propagation in unstiffened panels of aluminum and titanium. Program results will be used to develop fracture and crack growth hypotheses suitable for automated application in predicting the safe life and residual strength of an aircraft structure. Related studies into the fundamental nature of fracture and crack growth will be performed.

Supporting agency address information: Naval Air Systems Command 320B, Washington, D.C. 20361

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0058, ADVANCED MATERIALS FOR AIRCRAFT ENGINES
R.G. MAHORTER, U.S. Navy, Air Vehicle Technology Dept., *Warminster, Pennsylvania* 18974

To develop improved materials which, due to higher stress to density and modulus to weight ratios and improved corrosion/oxidation resistance, will permit the construction of more efficient aircraft engines. Specific objectives include (1) the characterization of attractive candidate metal matrix systems which are promising for development exploitation and (2) the development of improved alloys for higher temperature and/or higher rotational speed operation.

Three techniques are being explored to produce finished Be-Ti metal matrix composite shapes directly from starting materials. These are (1) co-extrusion and rolling of different Be-Ti alloy combinations, (2) co- extrusion and rolling of Be-Ti powder metal material, and (3) continuous diffusion bonding and continuous isothermal shape rolling of Be-Ti composite material. Mechanical properties and production costs of the composites will be determined. Vanadium alloys will be evaluated for potential engine applications. This system has the advantages of low density, good ductility, and high melting point. Initial work will be directed toward disc applications in the 900 degrees F to 1000 degrees F range to avoid the need for coating development.

Supporting agency address information: Naval Air Systems Command 320A, Washington, D.C. 20361

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0059, DEVELOPMENT OF COMPOSITE STRUCTURE FOR NAVAL AIRCRAFT
E.J. MCQUILLEN, U.S. Navy, Air Vehicle Technology Dept., *Warminster, Pennsylvania* 18974

To develop design, analysis and fabrication methods to obtain improved aircraft structures using advanced composites, and demonstrate weight savings and flight-worthiness of primary and

secondary structures. The use of cost effective composite structures will result in improved naval aircraft performance because of reduced weight (20-50 percent) in addition to increased reliability and less maintenance.

Several types of structure applicable to Navy aircraft are designed, fabricated, laboratory tested and flight tested. These include an 1-4 horizontal stabilizer, BQM-34E wing, wing/fuselage component for VTOL fighter attack prototype, landing gear door, over-wing fairing, control surfaces and a reconfigured rpv airframe. Subcomponents (such as wing boxes) and VTOL canards are designed and fabricated for demonstrating new design concepts with high temperature materials such as boron-aluminum composites. Low cost graphite components are being developed which are cost competitive with the conventional metal components. Static, fatigue and vibration tests are performed to qualify the components for flight evaluation. Major problem areas are identified and are being resolved.

Supporting agency address information: Naval Air Systems Command 320B, Washington, D.C. 20361

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0060, ANALYTICAL METHODS FOR ADHESIVE BONDED STRUCTURES FOR NAVAL AIRCRAFT
J. MINECCI, U.S. Navy, Air Vehicle Technology Dept., *Warminster, Pennsylvania* 18974

To improve the efficiency and reliability of adhesive bonded structures by devising analytical methods to ensure mechanical compatibility between adhesive and adherends. Achievement of this objective will reduce failures in naval aircraft which result from the conventional design of bonded constructions.

A theoretical and experimental investigation of the effects of adhesive properties on the strength of bonded sandwich structures, taking into account orthotropic material properties in adhesives, facings and cores, as well as nonlinear elastic and viscoelastic properties of the adhesive. Transient vibratory and cyclic (fatigue) loading will be considered as well as quasi-static loading. Also included, as a basis for further analysis, is an experimental study to evaluate the mechanical properties of adhesives under transient loading.

Supporting agency address information: Naval Air Systems Command 320B, Washington, D.C. 20361

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0061, MATERIALS FOR IMPROVED DEPENDABILITY AND SURVIVABILITY IN AIRCRAFT
L. STALLINGS, U.S. Navy, Air Vehicle Technology Dept., *Warminster, Pennsylvania* 18974

Increase the probability of proper aircraft system performance in service by developing new and improved materials for a safer fire resistant hydraulic fluid and long term preservation, as well as minimizing variability and eliminating deficiencies in materials.

1. Develop a superior fire resistant hydraulic fluid suitable for use at elevated temperatures (350 degrees-400 degrees F). 2. Develop a single application, sprayable, strippable coating that will provide protection to aircraft surfaces for a period of 5 years without reprocessing. Narrow voids will be spanned by the coating, eliminating taping, but tapes will be used to secure newly developed engine covers to the skin.

Supporting agency address information: Naval Air Systems Command 320, Washington, D.C. 20361

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0062, STUDIES IN THE CHEMISTRY OF ORGANO-METALLIC COMPOUNDS 5430-C
R. PETTIT, Univ. of Texas, Graduate School, *Austin, Texas* 78712 (DA-ARO(D)-31-124-71-G106)

To study the chemistry of organo-metallic compounds. The incorporation of various iron-containing units into the structure of molecules of plastics and fibers should confer on these materials desirable properties like fire retardancy.

Areas of study include- cyclobutadiene and metal complexes- cyclobutadiene and iron tricarbonyl in synthesis- tetraene and iron monocarbonyl complexes- metal catalyzed concerted reactions- and trimethylene methane complexes.

Supporting agency address information: OCRD Research Office Durham, Durham, N.C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

3.0063, HOT CORROSION OF GAS TURBINE ALLOYS
J. STRINGER, Univ. of Liverpool, *Liverpool, England, United Kingdom* (AF-AFOSR-2388-72)

AF function - materials for gas turbine engine application. Deficiency - insufficient knowledge of the mechanism of the corrosion mechanisms existent within the gas turbine engine environment to describe the proper metal alloy combinations for engine component application. Research - in-house investigations at ARL are aimed at determining the corrosion mechanisms acting on the typical nickel-based superalloy systems and other alloy systems (TiAl for example) having potential gas turbine application. How research contributes - it is anticipated that data/results will have immediate impact on the direction and output of the USAF laboratories in-house corrosion programs and ultimately contribute to the next generation gas turbine engine material systems.

The principal investigator will visit the ARL at Wright-Patterson AFB, Ohio, during the period 1 July 1974 to 30 October 1974 to discuss programs of mutual interest on high temperature oxidation. Prof. Stringer will conduct seminars and act in the capacity of consultant to research scientists conducting in-house investigations on hot corrosion and high temperatures oxidation.

Supporting agency address information: European Office of Aerospace Research & Development NRE, FPO, New York 09510

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0064, HEATING RATE EFFECT ON THE PYROLYSIS AND OXIDATION AND COMBUSTIBLE SOLIDS
A.D. BAER, Univ. of Utah, School of Engineering, *Salt Lake City, Utah* 84112

The pyrolysis and ignition in air of polymers and combustible solids will be studied by means of a special thermal analysis technique. Thin sample films will be heated at predetermined rates from 0.1 to 1000 degrees K/sec under a variety of test conditions which closely simulate practical ignition and combustion conditions. The critical thermal, chemical and fluid dynamic parameters of the ignition and burning process for the two-phase system will be characterized. At the various heating rates, measurements will be made of the film ignition temperature for several sample configurations, the sample mass loss as a function of temperature, the thermal energy requirements for pyrolysis and the feedback heat flux to the sample during the transition from ignition to steady burning. At relatively high heating rates, piloted ignition occurs before a significant fraction of the polymer samples is gasified. The initial pyrolysis reactions are thus very important, and these reactions will be studied by measurement of the infrared absorption spectra of the films during heating by use of a millisecond- scan spectrometer. The total pyrolysis characteristics of materials are critical to the combustion process, and these characteristics will be determined for several materials. The results of the total pyrolysis tests will be interpreted in terms of a model which considers random scission of the polymer chain with a temperature-dependent vaporization of scission products.

SUPPORTED BY U.S. Natl. Science Foundation

3.0065, CONFORMATIONAL ANALYSIS OF POLYMERS 10259-C
R.H. BOYD, Univ. of Utah, School of Engineering, *Salt Lake City, Utah* 84112 (DAHC04-72-C-0002)

To study the conformational properties of a number of polymers in order to predict material properties of a plastic from knowledge of the chemical structure of the polymer. Relevance: This study will result in more efficient selection and design of polymers for optimum service in diverse items of Army equipment and supplies (binders for solid propellants, insulation for wire, containers for ammunition, canteens for water, and composite plastics for personnel armor and rocket launch tubes).

Investigations of calculations in which the internal energies of the polymer chain are represented by empirical functions of molecular coordinates such as bond rotation angles will be made. Glass transition temperatures, heats of formation, vibrational spectra and gas phase thermodynamic functions will be correlated in determining energy functions. Polymers studied will include polystyrene, poly-alpha- methylstyrene, polymethylacrylate and polymethylmethacrylate.

Supporting agency address information: OCRD Research Office Durham, Durham, N.C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

3.0066, SOME CHEMICAL REACTION OF NITRO-ORGANIC COMPOUNDS 8380-C

M.J. STRAUSS, Univ. of Vermont, Graduate School, *Burlington, Vermont* 05401 (DAHC04-69-C-0064)

To study the chemical reactions of certain anionic complexes. The compounds to be studied are potential detonators, initiators, explosives and propellants.

Study and characterization of the stable bicyclic nitropropranenitronates and related compounds. Isolable complexes will be subjected to oxidation-reduction reactions, to electrophilic and nucleophilic reagents, and to pyrolysis. More information will be determined to explain the recent discovery that these compounds form metal complexes. The studies will be extended from the original electron-deficient trinitroaromatics to include tricyano-, tricarbomethoxy-, and triacetyl- compounds. The formation thermodynamics of the bicyclic systems and their monocyclic,sigma complex precursors will be determined.

Supporting agency address information: OCRD Research Office Durham, Durham, N.C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

3.0067, NAVY ENVIRONMENT - THE HIGH TEMPERATURE OXIDATION BEHAVIOR OF METALS AND ALLOYS

K.R. LAWLESS, Univ. of Virginia, School of Engineering, *Charlottesville, Virginia* 22903 (N000014-69-A-0060-0002)

The purpose of this research is to determine and understand the fundamental mechanisms of oxidation so that we will know how to engineer and provide more oxidation resistant materials for use in naval systems such as turbojet engines, boilers, etc.

Tantalum and its alloys will be oxidized under controlled conditions of temperature and oxygen pressure. Using electron microscopy and diffraction techniques, a study will be made of the various oxide phases or structures formed at various periods of time during the oxidation reaction. In addition, a study of the surface structures formed on exposure of the metals to oxygen will be made using both low energy electron diffraction and auger spectroscopy. Tantalum alloys were chosen for study because they typify metals systems which are capable of dissolving large amounts of oxygen during the oxidation process.

Supporting agency address information: Office of Naval Research 471, Arlington, Va. 22217

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0068, HT72-2- ENGINEERING PROPERTIES OF MATERIALS, ARMY AIRCRAFT STRUCTURES

T.L. MAZZA, U.S. Army, Air Mobility Res. & Dev. Lab., *Newport News, Virginia* 23604

To develop in-house testing techniques, specimen fabrication capability, required test equipment capability and instrumentation readouts for the determination of the engineering properties of materials for use in Army aircraft structures.

Continue work efforts initiated under house tasks PS 70-6, PS 70-8, PS 70-9, and PS 70-10 in establishment of in-house capability for determining material characteristics of fiber reinforced composite materials. During the course of this effort, a structures division handbook will be prepared to give detailed 'cookbook' testing procedures for determining specific material properties.

Supporting agency address information: AVCOM Eustis Directorate, Air Mobility Research and Development Laboratory, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

ENGINEERING

Includes Engineering (general); Communications; Electronics and Electrical Engineering; Fluid Mechanics and Heat Transfer; Instrumentation and Photography; Lasers and Masers; Mechanical Engineering; Quality Assurance and Reliability; and Structural Mechanics. For Related Information See Also Physics.

4.0001, FLUIDIC SUPPORTING TECHNOLOGY/REAL TIME RELIABILITY

D.J. SCHAFFER, Signal Companies Incorporated, *Phoenix, Arizona* 85034 (DAAG39-72-C-0092)

To obtain real-time reliability for fluidic systems.

Failures and other pertinent information from laboratory and experimental flight tests will be recoded by the contractor for a number of fluidic systems manufactured by him. Active monitoring of fielded fluididc systems will also be included. The work is coordinated through the government fluidics coordination group which supplements the effort and assists in planning.

Supporting agency address information: AMC Harry Diamond Labs, Washington, D.C. 20438

SUPPORTED BY U.S. Dept. of Defense - Army

4.0002, HOLOGRAPHIC VISOR HELMET-MOUNTED DISPLAY BREADBOARD MOCK-UP

R.N. WINNER, Hughes Aircraft Company, *Culver City, California* 90230 (F33615-73-C-4110)

The overall objective of this effort is the development of a holographic visor helmet-mounted display (HVHMD) capability for the purpose of providing a solution to several major problem areas associated with visually-coupled systems. Specifically, the HVHMD will (1) provide a quality image presentation by increasing the overall resolution of the system, (2) eliminate inherent field-of-view limitations in present concepts, (3) eliminate the necessity for a complex, specifically shaped visor design, and (4) reduce ultimate fabrication expense. In addition, the HVHMD will provide a significant system weight reduction, overall simplification, and improved CG factor. The breadboard resulting from this program will demonstrate the feasibility of this concept and provide a much needed input to P. E. 64708F/Project 5973, AMRL's visually-coupled Systems Development Program and visually-coupled systems operational applications for Air Force fire control/weapon delivery, reconnaissance, navigation and flight control applications.

The approach in this program is to display video information from a narrow bandwidth phospher miniature cathode-ray-tube (CRT) using a holographic lens array implemented onto a spherical acrylic helmet visor in a standard flight helmet.

Supporting agency address information: 6570 Aerospace Medical Research Lab HE, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0003, DETERMINATION OF PHYSIOLOGICAL RESPONSES OF PARACHUTISTS TO THE AEROSPACE RECOVERY ENVIRONMENT

D.W. CALL, U.S. Navy, Aerospace Recovery Facil., *El Centro, California* 92243

To acquire physiological and force data from parachutists continuously throughout parachuting operations; to correlate biomedical and engineering parameters; to use present technology to solve specific fleet problem areas; to support the scientific design, development and testing of future life support systems to enable better human engineering; to investigate basic human response to dynamic environments.

Multi-channel (9, or 15 units) fm/fm telemetry systems are primary data acquistion systems and have been described (Proc. Intl. Telemetering Conf. 7 (9); 218,229, 1971/NAVMISCEN TP-71-70, 7 Jan. 72). Single channel tape recorder ECG units are backup and for Salton Sea and cockpit use. Parameters include: ECG (rate and rhythm), respiratory rate, riser forces, triaxial accelerations, rectal, and skin temperatures, EOG, event marker, voice.

Supporting agency address information: Bureau of Medicine & Surgery 7113, Washington, D.C. 20372

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0004, ESCAPE SYSTEMS CONSULTING SERVICES AND ENGINEERING SUPPORT
L.E. NEIPLING, U.S. Navy, Aerospace Recovery Facil., *El Centro, California* 92243

Provide technical consulting services and engineering support in the fields of escape, recovery, and survival systems for aerospace craft.

Provide short term, on call, engineering consultation and evaluation support to other governmental facilities and to contractors as directed by NAVAIR. Engineering consultation and support may include aspects of design, development, opinion, analysis, advice and reporting from preliminary specification and design to operational performance.

Supporting agency address information: Naval Air Systems Command 5315A, Washington, D.C. 20361

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0005, NAVY VEHICLE DESIGN AND CONSTRUCTION: IDENTIFICATION FOR NAVAL SYSTEMS
E. TSE, Systems Control Incorporated, *Palo Alto, California* 94306 (N00014-72-C-0327)

The complexity of modern naval systems such as high performance aircraft, submarines, etc., and the techniques developed recently for identification of system parameters require new techniques for mathematically modelling systems. The objective of this effort is to develop methods for mathematically modelling modern Navy systems for the purpose of improved simulation and design. Both model structure determination and optimal input design will be considered with the goal of providing methodology for practicing naval engineers.

This effort will consider problems of model structure determination, identifiability and uniqueness, and optimal input design. In particular, the work will include the derivation of an objective validation test for determining the structure of multivariable stochastic linear systems, an investigation of an on-line updating method for estimation of the parameters of linear systems and the development of a new formulation for closed-loop system identification.

Supporting agency address information: Office of Naval Research 432, Arlington, Va. 22217

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0006, HYBRID TWT FEASIBILITY STUDY
A. SCOTT, Varian Associates Incorporated, *Palo Alto, California* 94304 (F30602-73-C-0297)

The objective of this effort is to determine the feasibility of developing a half octave bandwidth traveling wave tube of hybrid design employing a ring bar driver circuit and a coupled cavity output without resorting to complex frequency selective loading techniques.

An engineering program to establish the feasibility of a hybrid traveling wave tube employing the ring bar circuit as a driver and the coupled cavity circuit as the output section will be provided. The effort will include the design, fabrication, and evaluation of one or more breadboard models of a hybrid TWT.

Supporting agency address information: Rome Air Development Center OCT, Griffiss AFB, N.Y. 13440

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0007, GAAS TECHNOLOGY STUDY
A.S. JOSEPH, Rockwell International Corp., *Thousand Oaks, California* 91360 (F19628-74-C-0038)

AF function - improved missile and satellite systems. Deficiency - lack of solid state devices that operate at x band frequencies. Research - investigation of the important technological problems affecting GaAs device fabrication. How research contributes - fundamental materials problems associated with device fabrication in GaAs will be investigated. The solution of these problems will permit the increase of both yield and performance of GaAs, high frequency devices.

Supporting agency address information: AF Cambridge Research Laboratories LQ, L. G. Hanscom Field, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0008, ADVANCED INERTING TECHNIQUES FOR AIRCRAFT FUEL TANKS
P.A. BENSON, Garrett Corporation, *Torrance, California* 90509 (F33615-71-C-1901)

To design and fabricate a breadboard catalytic combustion inerting system and to conduct an extensive series of ground test to verify performance.

This will be the last phase of a three phase catalytic reactor program. The first phase (FY 69) was mainly concerned with the combustion process, the second phase (FY 70) developed a preliminary design of a prototype system and this phase will evaluate the concept by providing breadboard hardware and conducting ground test. The in-house section of this form is included to cover additional ground testing of the contractor delivered hardware.

Supporting agency address information: AF Aero-Propulsion Laboratory SFH, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0009, INSTRUMENTATION/ENGINEERING
J.D. MCFADDEN, U.S. Dept. of Commerce, Environ. Research Laboratories, *Boulder, Colorado* 80302 (8G170650)

Project objective: Development, improvement, modification, installation and maintenance of scientific instrumentation on all RFF aircraft. This includes all standard meterological sensors, inertial platforms, photo equipment, radar, and data acquisitions systems.

Current year plan: RFF personnel will carry out above development work, and maintain the instrumentation for RFF assigned scientific projects.

Progress report: Continued work on calibration techniques. Performed airframe modifications, received special equipment and installed instrumentation required for particular projects. Performed required maintenance for all scientific instrumentation installed in RFF aircraft.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

4.0010, MILITARY LASER HEAD-UP DISPLAY, FLYABLE DEMONSTRATOR
P.H. ANDERSON, Carson Labs. Incorporated, *Bristol, Connecticut* 06011 (N00019-70-C-0399)

To design a flyable demonstrator laser head-up display (HUD) and to fabricate the display's most critical components which are the laser beam deflection system, the collimating, hologram lens, and the flyable laser.

The contractor will research, design, and build the three critical components of the flyable laser head-up display (HUD). The approaches for the critical components are: (1) the laser beam deflection system will be based on a phased array of electro-optical crystals. (2) The collimating hologram lens will be a flat plate phased hologram. (3) The flyable laser will be a compact, low power heluium-neon laser. A complete flyable laser HUD will be designed based on the three critical components.

Supporting agency address information: Naval Air Systems Command 53372E, Washington, D.C. 20361

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0011, TURBINE ENDWALL HEAT TRANSFER ANALYSIS
R.E. OLSON, United Aircraft Corporation, *Hartford, Connecticut* 06118 (N00019-74-C-0302)

To develop an analytical procedure for computing the heat transfer to the endwalls of a high-temperature turbine.

The procedure will consist of numerically solving a set of three- dimensional viscous flow equations having the necessary generality to describe the formation and growth of the secondary flow corner vortices.

Supporting agency address information: Naval Air Systems Command 310, Washington, D.C. 20361

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0012, RADIATION INDUCED DEFECTS IN INFRARED DETECTOR MATERIALS
D.L. MITCHELL, U.S. Navy, Research Laboratory, *Washington, District of Columbia* 20390

The objective of this program is to establish the experimental and theoretical basis for modeling the degradation of infrared detectors in a radiation environment. Attainment of this objective will assist in the design of radiation hard sensor systems and will provide cost reductions in the test programs required for hardness assurance of sensor systems in satellites and missiles.

Experiments will be conducted to determine the nature and the effects of radiation induced point defects on detector parameters in detector grade InSb single crystals. Solid state theory will be applied to relating the induced damage centers to the performance of photo voltaic and photo conductive detectors so that their relative hardness can be assessed.

Supporting agency address information: Office of Naval Research Code 521 (427), Arlington, Virginia 22217

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0013, MICROWAVE MAGNETIC DEVICES FOR COMMUNICATION AND CONTROL
L. YOUNG, U.S. Navy, Research Laboratory, *Washington, District of Columbia* 20390

There is a need for improved secure and covert communication systems, from voice communications to remotely piloted vehicles. To reduce the probability of intercept for medium to short-range communication systems, we should operate in the microwave/millimeter wave region. The technical objective is to develop a capability in spread-spectrum and signal-processing techniques in the microwave/millimeter wave region, so that by the time the systems requirements will have been detailed, the technology will have been developed to meet the new requirements.

Acoustic surface waves are well suited to spread- spectrum techniques, but only up to about 1 GHz. Magnetostatic surface waves and ferrimagnetic devices are well suited to perform the same and similar functions up to at least 20 GHz. A similar effort as has gone into acoustic surface waves should now be started on magnetostatic surface waves. It is planned to exploit recent advances in the controlled growth of epitaxial errite films and to improve the quality of those films, and to develop microwave devices using magnetostatic surface waves of ferrimagnetic resonance.

Supporting agency address information: Naval Electronic Systems Command (033), Washington, D.C. 20360

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0014, UTILIZATION OF ADVANCED SHOCK TUBE FACILITIES
H. GRONIG, Technische Hochschule, *Aachen, Federal Republic of Germany* (F44620-72-C-0092)

AF function - a. High speed and/or high altitude flight. B. Detection and identification of reentry objects. Deficiency - a. Incomplete knowledge of aerothermodynamics and chemical kinetics of air and other gases. B. Lack of facilities for testing at reentry conditions. Research - to provide a summary of research performed in new facilities providing simulation of reentry conditions and enabling basic properties of gases to be determined. New knowledge gained will be provided to the Air Force. How research contributes - besides providing basic knowledge which is presently lacking, the reports will enable the Air Force to make decisions regarding development of its own facilities for research in this field.

The investigator has completed a new shock tube laboratory incorporating advanced facilities and instrumentation. Under this grant, the investigator will provide a description of the facilities and their capabilities. Copies of research reports, articles, etc., resulting from research in the lab will be furnished. A final report containing a short summary of research pursued, advances made, and plans for the future will be provided.

Supporting agency address information: European Office of Aerospace Research and Development NRE, FPO, New York 09510

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0015, WIDEBAND FH/CHIRP FEASIBILITY
J. OTTO, Radiation Incorporated, *Melbourne, Florida* 32905 (F30602-74-C-0184)

The objective of this effort is an effort to study and demonstrate the spread spectrum modulation technique designed under Contract F30602- 72-C-0498 for application to the unmanned remotely piloted vehicle (RPV) concept.

The approach to be taken in this effort is to breadboard the command uplink design and study its performance in both noiseless and simulated noisy environments. The objective of these studies will be to determine the viability of this modulation technique in the RPV concept. The end item of this effort will be a final technical report describing the results of the experimentation.

Supporting agency address information: Rome Air Development Center DCI, Griffiss AFB, N. Y. 13440

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0016, FORWARD LOOKING INFRARED SENSOR SIMULATION IN NAVAL TRAINING DEVICES
E. MALDONATO, U.S. Navy, Training Equipment Center, *Orlando, Florida* 32813

Develop a method of simulation of airborne forward looking infrared (FLIR) systems for training of military operators. FLIR sensor systems are new and require cost effective methods of training. FLIR presents a new challenge in simulation because it has a much better angular resolution than radar and requires simulation of a greater amount of data per unit area. FLIR has a better resolution than the human eye. The approximate resolution of the eye is 1 arc min.

The basic approach is to use a video monitor and electronic insetting to simulate the FLIR display. In this approach targets are no longer physically placed into a terrain background. The background and each target uses a separate video camera and the target images are electronically inserted into the background on the video monitor. Background can be provided by model board, photographic read only memory or computer generated.

Supporting agency address information: Naval Air Systems Command 340D, Washington, D.C. 20361

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0017, EQUATORIAL IONOSPHERIC STUDY
J.R. KOSTER, Univ. of Ghana, *Accra, Ghana* (AF-AFOSR-2258-72)

AF function - communications and navigation. Deficiency - fading and pulse delays. Research - provides observations of equatorial signal disruption. How research contributes - data used in global model now in process. This work helps furnish the equatorial ionospheric parameters used in the ionospheric physics laboratory global ionospheric model. These parameters (size, shape velocity, diurnal and seasonal occurrence of ionospheric irregularities) are the basis of prediction of the disruptive effects on radiowave propagation. Recent work from the contractor established a correlation between diurnal patterns of polarization rotation and irregularity structure causing fading.

Supporting agency address information: AF Cambridge Research Laboratories LI, L. G. Hanscom Field, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0018, TRANSIONOSPHERIC PROPAGATION MIDDLE EAST
H.K. AFSHAR, Geophysical Institute, *Tehran, Iran* (AF-AFOSR-2673-74)

AF function - communications, radar and navigation. Deficiency or opportunity - lack of knowledge of the low latitude ionosphere yields communications outages and navigation inaccuracies. Objective - the object of this research is to measure and catalogue ionospheric parameters over the middle east. How research contributes - by measuring scintillation and electron content provides input data to a global ionospheric model used for navigation error and signal loss prediction.

Supporting agency address information: AF Cambridge Research Laboratories LI, L. G. Hanscom Field, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0019, LOW LATITUDE RADIO PROPAGATION
J. MASS, Natl. Comm. For Space Research, *Haifa, Israel* (F44620-72-C-0059)

AF function - communications and navigation. Deficiency - fading and range errors. Research - provides data for statistical model of global ionosphere. How research contributes - provides low-elevation UHF propagation data for global ionospheric model. Using a newly mounted 30 foot fully steerable parabolic antenna, studies of ionospheric and tropospheric effects at UHF will be intensified. A new 400 MHz receiver, locally developed, will be used to study ionospherically induced errors in satellite Doppler navigation systems.

Supporting agency address information: AF Cambridge Research Laboratories LI, L. G. Hanscom Field, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0020, AIR-OIL MIST BACK-UP LUBRICATION PROGRAM FOR ARMY AIRCRAFT ENGINES
R. BERNIER, U.S. Army, Ballistic Research Lab., *Aberdeen Proving Ground, Maryland* 21005

To investigate the feasibility of an oil-mist lubrication system as an emergency back-up system for Army helicopter turbine engines.

Under combat conditions, Army helicopter engines currently are exposed to hostile environments wherein projectiles rupture the lubrication reservoir systems causing aircraft crash situations. To provide the time required for safe landing, an additional emergency back-up system is being investigated as a means to reduce this vulnerability. To accomplish this task, an oil-mist emergency lubrication system as a back-up capability within the turbine engine will be investigated.

Supporting agency address information: AMC Coating & Chemical Lab, Aberdeen PG, Md. 21005

SUPPORTED BY U.S. Dept. of Defense - Army

4.0021, AERO- AND THERMODYNAMICS OF RV NOSE TIPS
R. PHINNEY, U.S. Navy, Ballistics Department, *Silver Spring, Maryland* 20910

To improve the computational codes for the prediction of nose-tip ablation. A secondary objective is to develop NOLS capability for this type of work, either in-house or by supervising a contractor.

The work would focus on the two critical areas of most importance for the calculation of nose-tip ablation, (1) the effect of transition on nose recession, (2) the effect of surface roughness on transition and on turbulent heat transfer. These areas are being studied separately at NOL. This portion of the program would integrate this work with the computer code. This would involve providing computational services to the theoretical phases, as well as incorporating the most recent theoretical developments into the computer code. Experimental studies have been conducted to assist and validate the theoretical portions of the program.

Supporting agency address information: Naval Ordnance Systems Command, Department of the Navy (ORD-035), Washington, D.C. 20360

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0022, HYPERSONIC FLOW OVER REENTRY VEHICLES AT ANGLES OF ATTACK
J.A. SOLOMON, U.S. Navy, Mathematics Department, *Silver Spring, Maryland* 20910

The proposed effort will be to develop high-speed computer codes for the calculation of the three-dimensional inviscid flow field over arbitrary shaped reentry vehicles flying at hypersonic speeds at angle of attack. The code will calculate the pressure distribution on the body which gives the aerodynamic force, moment coefficients, and center of pressure necessary for the aerodynamic design of maneuvering reentry vehicles (MRV) and high performance ballistic vehicles (BRV). The calculated results are also necessary in order to make boundary layer calculations required in the design of the heat shield.

The governing three-dimensional, steady, inviscid, compressible flow equations will be solved numerically in two steps. In the first step the transonic flow near the nose tip will be computed up to the development of supersonic flow in the shock-layer. The second step solves for the supersonic region by marching downstream along the body axis using as initial conditions the results obtained in step one. Finite difference methods will be used in both steps.

Supporting agency address information: Naval Ordnance Systems Command, Department of the Navy (ORD-035), Washington, D.C. 20360

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0023, TETHERED BALLOONS
D.E. JACKSON, U.S. Air Force, Cambridge Research Labs., *Bedford, Massachusetts*

AF function - advanced balloon systems (surveillance, reconnaissance, communications, environmental research support, space equipment tests, delivery operations). Deficiency - inability to evaluate strategic and tactical weapon systems and military reconnaissance, communications and satellite systems. Inability to utilize balloons in military systems. Research - balloon materials, tether cables, instrumentation, ground handling equipment and procedures and test flights to extend payload and/or altitude capabilities. How research contributes - research aids in achieving higher altitudes with heavier payloads for long duration, economic evaluation testing of military weapons systems. Improvements in balloon system components increase system performance in areas of altitude, stability, payload weight or duration. Programs dependent upon this research include- 698AJ (USAF/SAMSO), Priority 01A, 621B (USAF/SAMSO), Pocket Veto (USAF/ADC), TORUS (USAF/SAMSO), MERDC-HOMINE (U.S. Army).

Supporting agency address information: AF Cambridge Research Laboratories LC, L. G. Hanscom Field, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0024, POWERED BALLOONS
A.O. KORN, U.S. Air Force, Cambridge Research Labs., *Bedford, Massachusetts*

AF function - advanced balloon systems (surveillance, reconnaissance, communications, environmental research support). Deficiency - present vehicles have trajectory control capabilities limited to a matter of hours on station. Research - propulsion and steering systems, navigation systems, altitude control and power sources. How research contributes - provides controllable balloon trajectories for militarily related atmospheric measurements, use as high altitude equipment test beds, and carriers for operational military systems. This work involves the design of an aerodynamically shaped balloon and a propulsion system, and will result in stationkeeping missions at high altitudes for over a week. The omega navigation system will be studied for application to this work. This will also add to the body of knowledge relating to balloon materials, power source application to balloons and meteorological phenomena.

Supporting agency address information: AF Cambridge Research Laboratories LC, L. G. Hanscom Field, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0025, THERMAL ENERGY CONVERSION
C.C. LEIBY, U.S. Air Force, Cambridge Research Labs., *Bedford, Massachusetts*

AF function - electrical power supplies for space operations. Deficiency - inadequate devices for direct conversion of heat to

electricity. Research - investigation of known high temperature phenomena for evaluation as practical energy conversion mechanisms. How research contributes - identifies new energy conversion mechanisms which can be used in electrical power supplies. The research here is directed toward the identification of phenomena which can be utilized for new means of direct conversion of heat to electricity. Present research is devoted to theoretical and experimental evaluation of the phenomenon of electrophoresis in plasmas. The results of the experiments used in the design of a thermally ionized electrophoretic energy converter is evaluated as a practical energy conversion device. In addition, new ways for neutralizing the space charge barrier in thermionic diodes are also considered. These include evaluation of new space charge plasma species and ion injection schemes.

Supporting agency address information: AF Cambridge Research Laboratories PH, L. G. Hanscom Field, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0026, EXCEDE
R.R. ONEIL, U.S. Air Force, Cambridge Research Labs., *Bedford, Massachusetts*

AF function - infrared optical detection systems. Deficiency - lack of knowledge of atmospheric processes controlling infrared and optical backgrounds. Research - study of processes producing infrared emission from NO and NO ion produced by electron energy deposition in the atmosphere. How research contributes - EXCEDE measures rates and infrared photon yields of reactions producing vibrationally hot NO and NO ion by deposition of electron energy at 100-110 km. EXCEDE consists of an electron accelerator and a series of photometers and radiometers, designed to measure the spectral, spatial and temporal nature of optical and infrared emission produced by an electron pulse of given magnitude and duration.

Supporting agency address information: AF Cambridge Research Laboratories OP, L. G. Hanscom Field, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0027, VOICE RECOGNITION AND SYNTHESIS SYSTEM (VRASS) FOR NAVAL AIRCRAFT
W. KARAVATOS, Raytheon Company, *Burlington, Massachusetts* 01803 (N62269-74-R-1024)

Provide required additional ADP equipment to construct online voice recognition and synthesis system (VRASS) for evaluation of VRASS language.

Deliver, and install ADP equipment ordered (e.g., disc system, priority interrupt, hardware multiply and divide) for NADC's Ratheon 704-system and deliver disc-oriented system library. Deliver analog to digital and digital to analog equipment. Checkout system to ensure proper installation.

Supporting agency address information: Naval Air Development Center, Crew Systems Dept. 402, Warminster, Pa. 18974

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0028, SHORT PULSE SWITCHES FOR AIRBORNE HIGH POWER SUPPLIES
R.J. THOME, Magnetic Corporation of Amer., *Cambridge, Massachusetts* 02124 (F33615-72-C-2098)

The objective of this effort is to demonstrate the feasibility of a high energy rotary switch for inductive energy storage systems. The switch must demonstrate the capability of adequate current capacity, switching time, voltage standoff and cycle life. The combination of voltage, current pulse rate and efficiency needed for an airborne system is not now available.

This is one of four switching concepts being funded. Initially this effort will emphasize defining the interface between the switch and an inductive energy storage device. Upon establishing the detailed performance characteristic desired, a rotary switch will be designed and fabricated to demonstrate that the rotary switch approach can meet the requirements. Concurrently a test facility will be established. The switch will be tested within the limits of this test facility. Emphasis will be placed on understanding the mechanisms limiting switch performance so that higher voltage, higher current, higher pulse rate capability can be predicted.

Supporting agency address information: AF Aero-Propulsion Laboratory POD, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0029, FINITE DIFFERENTIAL ANALYSIS PREDICTION OF LARGE ANELASTIC DEFORMATIONS OF TRANSIENTLY LOADED SHELLS (ABBREV)
E.A. WITMER, Mass. Inst. of Technology, School of Engineering, *Cambridge, Massachusetts* 02139 (DAAD05-68-C-0314)

The objective is broadened to include (a) generalization of the PETROS 3 Code to provide for the structural layers to be joined by soft- bond layers which undergo significant shear deformation and (b) performing experiments on shell response for the purpose of assessing the validity of the PETROS 2 and PETROS 3 Codes.

Approach - the nonlinear partial differential equations of motions will be solved numerically, employing the finite difference method. The procedure is an extension of that described in AFFDL-TR-66-171.

Supporting agency address information: AMC Ballistic Research Labs, Aberdeen PG, Md. 21005

SUPPORTED BY U.S. Dept. of Defense - Army

4.0030, BALLOON-BORNE RADIANCE STUDIES
A.H. HOWELL, Tufts University, School of Engineering, *Medford, Massachusetts* 02155 (F19628-73-C-0145)

AF function - detection and surveillance in support of strategic defense. Deficiency - background radiance is the limiting factor for detection and surveillance systems. Objective - measure background levels where unknown and establish calibration for system check. How research contributes - develops balloon-borne system for measurement of SWIR backscatter from stratospheric aerosol layers in support of DSP system. Develops and flys balloon-borne telescope systems to measure wavelength and time dependence of LWIR radiance from brighter celestial sources.

Supporting agency address information: AF Cambridge Research Laboratories LW, L. G. Hanscom Field, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0031, DESIGN, FABRICATE, LABORATORY TEST, AND EVALUATE AN ADVANCED HYDROFLUIDIC SERVOVALVE FOR ARMY HELICOPTERS
R.A. EVANS, Honeywell Incorporated, *Minneapolis, Minnesota* 55408 (DAAJ02-74-C-0015)

To provide Army aviation with hydrofluidic stabilization systems for V/STOL type aircraft. A system such as this would be capable of assisting the pilot in performing the majority of all control system functions necessary to more effectively execute the many all-weather tactical missions.

To investigate a hydrofluidic servoacturator which will contain a flow control valve concept utilizing poppet valve circuitry in place of the commonly used spool valve.

Supporting agency address information: AVCOM Eustis Directorate, US Army Air Mobility Research and Development Laboratory, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

4.0032, HOMING TECHNIQUES
B. DAVIS, U.S. Army, Advanced Avionics Sys. Tec. Ar, *Red Bank, New Jersey* 07703

Explore various techniques for improving the homing capability in Army aircraft. Concepts of phase sampling as well as coherent direction will be analyzed.

To analyze and develop a design concept which consists of sampling and processing the phase of the received signal at the left and right antenna locations and detect it synchronously in the FM receiver. A phase-lock coherent detection technique will also be studied for improving homing sensitivity and range.

Supporting agency address information: ECOM Avionics Lab, Ft. Monmouth, N. J. 07703

SUPPORTED BY U.S. Dept. of Defense - Army

4.0033, EVALUATION OF HEAD-UP DISPLAYS (HUD)
E.W. LEVINE, U.S. Army, Avionics Laboratory, *Red Bank, New Jersey* 07703

One method of enhancing the pilots visual capability during marginal visibility conditions is by the use of a head-up display (HUD). This device projects instrument information and mission requirement symbology on to a combiner where it is viewed at optical infinity directly in the pilot's line-of-sight. The pilot is thus able to obtain his flight or landing system information at eye level and more time is available for visual search of the outside world to determine the point of transition from instrument to contact flight. Most previous work in HUD has been done for fixed-wing aircraft. It is the objective of this effort to determine the suitability of HUD for rotary wing operations.

Conduct a comprehensive flight test program which will provide definitive data to be used in the make up of a standard for rotary wing HUD, as well as a performance specification for an Army head-up display.

Supporting agency address information: ECOM Avionics Lab, Ft. Monmouth, N. J. 07703

SUPPORTED BY U.S. Dept. of Defense - Army

4.0034, SMALL ANTENNA TECHNIQUES
R.E. TALLMAN, U.S. Army, Avionics Laboratory, *Red Bank, New Jersey* 07703

Develop new techniques in the design of low silhouette compact fm communication antennas.

Existing designs will be optimized and subassemblies improved. New state-of-the-art developments will be used to improve antenna performance.

Supporting agency address information: ECOM Avionics Lab, Ft. Monmouth, N. J. 07703

SUPPORTED BY U.S. Dept. of Defense - Army

4.0035, STRAPDOWN INERTIAL TECHNOLOGY
UNKNOWN, U.S. Army, Avionics Laboratory, *Red Bank, New Jersey* 07703

Conduct study of state-of-the-art and planned strapdown navigation systems which will project comparative cost, timeframe, availability, accuracies, weight, advantages, disadvantages, etc.

Literature search, study, and subsequent analysis with particular emphasis placed on strapdown navigation systems that use unconventional sensors such as laser gyros, ESG, etc. This study will be accomplished as part of a twofold strapdown navigation task. A hardware effort will be pursued in a joint Army-Air Force program which is reported under a separate 1498.

Supporting agency address information: ECOM Avoinics Lab AMSEL-VL- D, Ft. Monmouth, N. J. 07703

SUPPORTED BY U.S. Dept. of Defense - Army

4.0036, MULTI-FUNCTION SIGNAL EXPERIMENTS
J.J. PATTI, U.S. Air Force, Rome Air Development Ctr., *Rome, New York* 13442

The objective of this effort is to perform in-house design and experimental evaluation/ demonstration of the capabilities of advanced multi-function, wideband communications equipments. Of particular interest is the evaluation of anti-jam communications and position location capabilities of newly developed spread spectrum systems.

An analysis will be made of currently available spread spectrum equipments and modems being developed for RADC to determine applicability for the experimental program. Maximum use will be made of RADC facilities, such as flight test aircraft and the ROMANS and low cost air traffic control experimental test beds, for conducting the proposed experiments.

Supporting agency address information: Rome Air Development Center DCI, Griffiss AFB, N.Y. 13440

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0037, MODIFICATION OF A NUCLEONIC AIR DENSITY GAUGE IN PREPARATION FOR FLIGHT TEST EVALUATION
C.R. DUKE, Industrial Nucleonics Corp., *Columbus, Ohio* 43202 (DAAJ02-73-C-0011)

To prepare, install, and flight test a nucleonic air density gauge (ADG) capable of measuring ambient atmospheric density within the atmospheric and operational environments common to the UH-1H helicopter. This is one element of an overall program to develop a cockpit instrumentation system to accurately and remotely compute and display a helicopter's lift margin under any conditions.

An ADG, designed, fabricated, and laboratory tested for the Navy, will be modified as needed to withstand the flight environment of a UH- 1H helicopter.

Supporting agency address information: AVCOM Eustis Directorate, US Army Air Mobility Research and Development Laboratory, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

4.0038, INVESTIGATION OF ENERGY ADDITION TO A SUPERSONIC FLOW (APPLICABLE TO SUPERSONIC LASER SYSTEMS)
W.C. BURSON, U.S. Air Force, Aero Propulsion Lab., *Dayton, Ohio* 45433

Investigation of heat addition to a supersonic flow without generation of shock waves or a strong detonation.

A low pressure supersonic flow of an inert gas will be passed through a duct around which is wrapped a copper coil. The coil will be attached to a radio frequency (R. F.) power supply which will ionize and inductively heat the gas. The effect of energy addition on a supersonic flow may be found by taking static pressure, total pressure, and total temperature measurements. The effect of varying area with heat addition will also be investigated.

Supporting agency address information: AF Aero-Propulsion Laboratory RJT, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0039, ELECTROHYDRODYNAMIC DISPERSION STUDIES
S. WINELAND, Findlay College, Undergraduate School, *Findlay, Ohio* (F33615-73-C-2044)

To obtain improved performance of electric propulsion colloid thrusters by obtaining more detailed understanding of the spraying process. Emphasis will be placed on improving the exhaust velocity distribution.

Highly specialized instrumentation will be used to probe the operating colloid thruster. The results of this research will provide knowledge upon which a detailed theory of the spraying process can be formulated. With this improved understanding, it will be possible to increase performance by making the spraying process more efficient.

Supporting agency address information: AF Aero-Propulsion Laboratory POP, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0040, STRENGTH AND FAILURE CRITERIA FOR COMPOSITE AERO STRUCTURES
B.W. ROSEN, Material Sciences Corporation, *Blue Bell, Pennsylvania* 19422 (N62269-73-C-0800)

To provide understanding of failure mechanisms in fiber reinforced composite laminates. To identify the fundamental physics of the numerous interdependent, composite failure mechanisms. To formulate rational failure criteria based upon predominate interacting failure modes appropriate to various critical loading conditions. To deveop analytical procedures, based upon these failure criteria, to predict critical strengths of composite structures.

Apply background knowledge and analytical and mathematical skills to the development of new strength and failure theories for advanced filament reinforced composite materials. These theories will be based upon the fundamental ph sics of composite failure mechanisms. Analytical continuum and fracture

mechanics procedures will be applied to phenomenologically explain and numerically quantitize the various failure mechanisms. Experiments will be designed in light of the developed theory to elucidate and demonstrate the various failure phenomena.

Supporting agency address information: Naval Air Development Center, Air Vehicle Technology Dept. 3033, Warminster, Pa. 18974

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0041, CAMERA MODIFICATION AND REFURBISHING
A. TROILO, Broomall Industries Inc., *Broomall, Pennsylvania* 19008 (N62269-74-R-0191)

Services and material to refurbish and update two NAVAIRDEVCEN flight deck photographic data systems for obtaining day and night landing criteria.

Refurbish two cameras, miniaturize electronics for time, sequence number and recording of deck motion on each film frame and synchronize shutter with newly developed covert flasher for night landing data.

Supporting agency address information: Naval Air Development Center, Air Vehicle Technolology, Dept., Warminster, Pa. 18974

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0042, NON-SAMPLING DIGITAL SFR
A. ZEGER, General Atronics Corporation, *Philadelphia, Pennsylvania* 19118 (F30602-74-C-0242)

Request a PR be prepared for procurement of engineering services to investigate the feasibility and applicability of utilizing adaptive coherent interference cancellation techniques for continuous real-time, non-sampling same frequency (no frequency offset) repeating (SFR) for communications applications. Conventional same frequency repeaters (SFR) utilize sampling of the incoming signal and time sharing of both the transmit and receive functions as well as frequency offset schemes to obtain input/output isolation. For digital transmissions, the sampling off times can approach the bit duration times resulting in significant bit errors. A non-sampling real-time repeater utilizing interference cancellation techniques will be applicable to many communications systems using analog, digital and spread spectrum (either for multiple access or anti-jam) modulations and requiring transmission bandwidths of up to 10 MHz such as sensor systems, satellite systems, switching and multiplexing networks, RPV command and control, and future intra-base communications systems.

This effort will investigate the use of adaptive coherent interference cancellation techniques for applicability to non-sampling real-time same frequency repeating. Areas of investigation will include the effects and limitations for repeating various types of signal modulations (analog, digital and spread spectrum), operating bandwidths of up to 10 MHz, operating frequencies and data rates as well as effects of ground and airborne environments. Various other isolation techniques will be assessed which can be used in conjunction with interference cancellation to achieve optimum transmit/receive signal isolation (and therefore maximum forward gain thru the repeater). A feasibility demonstration of the technique will be implemented utilizing a wideband digital multiple access signal format at VHF as an example for possible future intra-base communications applications. This effort will be an ARPA directed sole source to the General Atronics Corp per ARPA Order No. 2750. The ARPA directed sole source justification is expected to be received with the ARPA order along with the General Atronics unsolicited proposal. This will be forwarded as soon as the ARPA Order is officially received.

Supporting agency address information: Rome Air Development Center DCC, Griffiss AFB, N.Y. 13440

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0043, INFORMATION EXCHANGE IN RELIABILITY AND MAINTAINABILITY
O. BJORKLUND, Military Electronics Lab., *Stockholm, Sweden* (F44620-74-C-0067)

AF function - reliability. Deficiency - existing failure rate data represent a small proportion of the reliability information required for the design of electronic equipment. Research - this research addresses the reliability and maintainability methodology, the analysis of test results and failures, and the evaluation of models of equipment and system reliability. How research contributes - this research, testing, and evaluation generates usable, necessary data that aids in the selection of components for new avionic system design.

Information on basic failure mechanisms for components and on reliability and maintainability for systems will be obtained. Methods for achieving better correlation between predicted, demonstrated, and operational reliability and maintainability will be developed.

Supporting agency address information: European Office of Aerospace Research & Development NRP, Box 14 FPO, New York, N.Y. 09510

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0044, ENERGY CONVERSION - FUNDAMENTAL PHENOMENA IN THE SEALING OF SHAFTS OF ROTATING MACHINERY
C.F. FISHER, Univ. of Tennessee, School of Engineering, *Knoxville, Tennessee* 37916 (N00014-68-A-0144)

The objectives of this program are (1) the identification of the significant phenomena involved in dynamic sealing, and (2) the presentation of experimentally verified theories suitable for exploitation in engineering applications. The fleet has many applications of dynamic sealing such as main propeller shaft seals, main shaft and interstage on/in advanced airbreathing engines and pumps.

This work concerns itself with the development or reevaluation of sealing concepts, development of experimental facilities and techniques for producing experimental evidence supporting the theoretical concepts and the preparation of an authoritative monograph on the theory and practice of dynamic sealing.

Supporting agency address information: Office of Naval Research 473, Arlington, Va. 22217

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0045, PERFORMANCE DOCUMENTATION OF THE 5-MW EOS ARC HEATER
D.D. HORN, Aro Incorporated, *Tullahoma, Tennessee* 37389 (F40600-74-C-0001)

The electro-optical system 'EOS' arc has been demonstrated to be highly efficient at low pressures. This project is to demonstrate the feasibility of the EOS heater to operate at high pressures.

The 5-mw EOS arc heater is to be operated on air at chamber pressures of 25, 50, 80, and 100 atm. A steady-state heat balance is to be obtained for three current levels at each chambber pressure. The effluent is to be surveyed with impact pressure probes and with an AFFDL furnished calorimeter. This effort is to be accomplished in accordance with the work statement outlined in ACO Formal Letter 1-94.

Supporting agency address information: Arnold Engineering Development Center, Arnold AF Stn., Tn. 37389

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0046, S-3A GRAPHITE SPOILER DEVELOPMENT
O.E. DHONAU, L T V Aerospace Corporation, *Dallas, Texas* 75222 (N62269-73-C-0610)

To design and develop a cost competitive graphite secondary structure fully qualified for flight. The development of innovative design and fabrication techniques will reduce the cost of composite structures and demonstrate that they are cost competitive with selected conventional structures. This program will demonstrate a cost reduction of up to 15 percent and a weight reduction of 26 percent compared to the metal spoiler.

This program includes component design, material selection, design verification testing of sub-elements, manufacturing development, component fabrication and laboratory tests. One full-scale component will be fabricated to verify the final component design, tooling, and manufacturing processes. After completion of the first component, four spoilers will be fabricated

and tested. Three spoilers will be static tested to failure to determine repeatability and one will be fatigue tested to a minimum of two life times.

Supporting agency address information: Naval Air Development Center, Air Vehicle Technology Dept. 30331, Warminster, Pa. 18974

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0047, NAVY VEHICLE DESIGN AND CONSTRUCTION - OPTICAL SIGNAL PROCESSING IN AIRCRAFT
W.C. SCOTT, Texas Instruments Incorporated, *Dallas, Texas* 75222 (N00014-73-C-0288)

Research effort is required to develop an optical source which can be fabricated monolithically and has sufficient mode control to allow efficient coupling into thin-film optical circuits.

A monolithic laser will be investigated based upon a unique structure defining the optical cavity. The end reflectors are formed by mesa growth and light is constrained by a thin film wave guide formed by the index grading profile between GaAs and GaInAs (the active material). Output will be taken from the cavity by a grating coupler which matches the cavity to the output wave guide. A theoretical model for this structure will be developed and confirmed experimentally.

Supporting agency address information: Office of Naval Research 411, Arlington, Va. 22217

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0048, BODY MOVEMENT FOR COCKPIT CONTROL OPERATIONS UNDER NORMAL ACCELERATIONS
M.M. AYOUB, Texas Technological University, School of Engineering, *Lubbock, Texas* 79409 (F33615-73-C-4073)

The ultimate objective of this research is to provide engineering- anthropometry data for the design of cockpits (or other manned workstations), specifically for the selection of controls, the arrangement of controls, and the operation of controls, for maximum efficiency under normal and emergency conditions. Such data are needed for USAF design handbooks for normal controls and for the evaluation of proposed emergency controls. The specific objective is to record, analyse, and describe the paths of movement of the hand, arm, shoulder, and eyes while the operator reaches from one control point to another.

Laboratory tests will be performed in the AMRL/HEA photogrammetric facility to record the sequential locations of body members involved in the performance of reach motions between target points (representing primary A/C controls). The data will be analyzed, mathematical formulas developed to represent the data, and be prepared for future incorporation into the computerized biomedical man-model Combiman.

Supporting agency address information: 6570 Aerospace Medical Research Lab HE, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0049, RE-EXAMINATION AND EVALUATION OF REQUIREMENTS/CONCEPTS FOR HIGH ALTITUDE PROTECTIVE EQUIPMENT
T.R. MORGAN, U.S. Air Force, School of Aerospace Med., *San Antonio, Texas* 78235

Current methods of weapon delivery in high performance aircraft expose the aircrew member to a variety of potential physiological hazards with respect to malfunction of cabin pressurization, oxygen and/or air conditioning systems. Accordingly, a vast array of emergency equipment has evolved to protect the flyer against a single point systems failure. Although adequate from a physiologic standpoint, many of these complex assemblies have been criticized by the crew member as being uncomfortable and highly restrictive during normal flight operations. Hence, a re-examination of existing concepts coupled with an in-depth review of newer requirements is necessary. Specific objectives are to develop a current awareness of state-of-the-art personal equipment on an international basis, to re-examine off-the-shelf equipment for application into future operational requirements, to assess the validity of protective requirements when exposures to extreme environmental conditions are brief and infrequent, and to test and evaluate newer concepts in high altitude equipment. Potential customers include- ASD/ENCCE Technology Need, May 72, HQ ADC/SG letter to ASD, 10 Mar. 72, HQ TAC/DRLS TWX, 18 Oct. 72.

During the remainder of FY 74 and in FY 75 efforts in this area will be intensified and directed toward a bilateral approach- (a) development of equipment for short term emergency high altitude protection, and (b) improvements in equipment for relatively long term uses. The coordination now established with various agencies and committees will be continued, and files documenting international technology will be maintained. Liaison with using organizations will be initiated in a rapid and thorough manner. Response to ASD/EN TN 15 May 72 will be reoriented toward active investigations in cooperation with ASD. Comparative analyses of existing technology will be documented and plans for in-house and contractual endeavors to advance technology will be completed by FY 75.

Supporting agency address information: USAF School of Aerospace Medicine VN, Brooks AFB, Texas 78235

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0050, DESIGN CRITERIA FOR ELASTOMERIC BEARINGS FOR HELICOPTER ROTOR AND CONTROL SYSTEMS
A. THOMPSON, Thiokol Chemical Corporation, *Brigham City, Utah* 84302 (DAAJ02-73-C-0091)

The technical objective of this program is the creation of a comprehensive design manual for elastomeric bearings. The effort includes analytical investigations/developments and tests necessary to define characteristics of the bearings.

Investigations concerning analytical procedures, bearing geometries, test specimen geometries and bearing performance preformance prediction will be conducted. Simultaneously a materials characterization program will be executed, to assure that representative materials are selected. Tests of the simple specimens will establish analytical predictions concerning failure initiation and propagation. Tests of full size complex bearings will verify the analytical predictions and procedures. Computer programs will be investigated for applicability in evaluating bearing geometries and loads, and modified as necessary to provide a suitable program for elastomeric bearing analyses. Design and test data accumulated will be evaluated and complied into the design manual.

Supporting agency address information: AVCOM Eustis Directorate, AVCOM Air Mobility R&D Lab, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

4.0051, REAL TIME SPECTRAL SYNTHESIZER FOR RAPID SCAN AIRBORNE FAR-INFRARED INTERFEROMETER
M.R. JOHNSON, Utah State University, School of Engineering, *Logan, Utah* 84321 (F19628-73-C-0022)

AF function - surveillance, advanced detectors, meteorology. Deficiency - lack of knowledge of far-infrared transmittance of the upper atmosphere. Research - improve instrumentation for measuring transmission of solar radiation through the upper atmosphere. How research contributes - transmittance will be determined for altitudes accessible to KC-135 aircraft at various latitudes. Abstract - the proposed work consists of the design and fabrication of a real-time spectral synthesizer for use with an airborne rapid scan far-infrared interferometer to improve measurements of atmospheric transmission.

Supporting agency address information: AF Cambridge Research Laboratories OP, L. G. Hanscom Field, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0052, IN-FLIGHT COLOR AERIAL FILM SENSITOMETRY
R.K. ROEDEL, U.S. Army, Geographic Info. Systems Div., *Fort Belvoir, Virginia* 22060

The objective is to test a sensitometric patch in each interframe gap of a roll of film as located in color aerial mapping camera. The patch, after processing, appears as a near neutral grey tone, which indicates processing errors, emulsion aging effects, and film handling characteristics (storage, etc.). This investigation may lead to improved film processing, resulting in more efficient use of film.

A breadboard model of the device was installed on an aerial camera and flown to demonstrate feasibility. The model will be refined, and ruggedized, bench tested and calibrated. It then will be installed in a suitable aerial camera and flight tested to confirm the design and objectives.

Supporting agency address information: OCE ETL Geographic Info. Systems Div., Ft. Belvoir, Va. 22060

SUPPORTED BY U.S. Dept. of Defense - Army

4.0053, PROBLEMS ASSOCIATED WITH THE GAS DYNAMIC LASER 10194-P

W.H. CHRISTIANSEN, Univ. of Washington, School of Engineering, *Seattle, Washington* 98105 (DAHC04-74-G-0031)

To study and improve the gas dynamic laser performance. Relevance: This work concerns the gas dynamic laser, which is the most powerful average power laser presently in existence within the Army. This research is closely related to Army in-house effort on comparable devices which are being developed for use in radar, surveillence and other military functions.

Experimental and theoretical kinetic research will be carried out on a 7 inch shock tube. Gain experiments will be made on various mixtures and different enthalpies. Numerical calculations will be made to determine the performance of new laser cavities. Efforts will be made to establish the limits of all-supersonic designs.

Supporting agency address information: OCRD Research Office Durham, Durham, N.C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

GEOSCIENCES

Includes Geosciences (general); Earth Resources; Energy Production And Conversion; Environment Pollution; Geophysics; Meteorology and Climatology; and Oceanography. For Related Information See Also Space Sciences.

5.0001, MIDDAY AURORAS AT THE SOUTH POLE STATION

S. AKASOFU, Univ. of Alaska, Geophysical Institute, *College, Alaska* 99735

A 35-mm all-sky camera will be operated at South Pole Station and a 16-mm all-sky camera will be operated at Siple Station. The data will be searched for correlations of auroral sub-storm activity and interplanetary magnetic field variations and sub-storm precursor clues. The Pole instrument is uniquely well situated to examine dayside aurora and, in concert with simultaneous ISIS satellite data, has shown that midday aurora occurs directly under the so called cusp precipitation region. The Siple instrument is providing visual information about ionosphere dynamics at sub-auroral zone latitudes. The data will be used in conjunction with simultaneous magnetospheric data collected at Siple to investigate the questions of how do the magnetosphere and ionosphere interact, and how is energy transferred from the magnetosphere to the ionosphere in its transit from the sun to the earth. The geographic position of South Pole makes it possible to detect visual aurora for time spans of days when the sky is cloudless, which is a normal condition. An attempt will be made to find relationships in the behavior of midday and midnight aurora and to delineate the different responses of midday and midnight aurora to changes in the interplanetary magnetic field.

SUPPORTED BY U.S. Natl. Science Foundation

5.0002, INSTALLATION AND TESTING OF A PROTOTYPE GEOPHYSICAL OBSERVATORY FOR THE ANTARCTIC/ SMALL STATION DEVELOPMENT

A.M. PETERSON, Stanford University, School of Engineering, *Palo Alto, California* 94305 (C582 AMEND 10)

Stanford University proposes to design and construct a small, low cost basic automatic station primarily useful for meteorological purposes in remote areas of Antarctica.

The station will provide approximately two cubic feet of volume for instrumentation and 10 watts of power from a propane thermoelectric generator. Waste heat from the generator will heat the enclosure, with excess heat being dumped to the external air to provide temperature regulation. The nominal temperature inside the enclosure will be approximately 15 degrees C although the minimum design temperature will be 0 degrees C. This station will be mounted above the snow surface rather than being buried. The station will provide sufficient power and volume to accommodate the ground transmitter for the RAMS package that will be flown on the NIMBUS-F and TIROS-N polar orbiting meteorological satellites, as well as for the SMS/GOES Data Collection Platform transceiver. Other potential uses are for Dry Valley biological monitoring, a VHF relay station for Dry Vally - McMurdo communications, and as a Siple Station remote for sensitive experiments affected by the Siple VLF transmitter.

Stanford will design and construct this station in time for shipment to Antarctica for the 1974-75 austral summer.

SUPPORTED BY U.S. Natl. Science Foundation

5.0003, NAVY ENVIRONMENT - DEVELOPMENT OF FORECASTING AIDS FOR THE NAVAL METEOROLOGIST

J.B. SMYTH, Smyth Research Associates, *San Diego, California* 92123 (N00014-71-C-0089)

The objective of this research is to explore relationships between the integrated electron content (IEC) of the ionosphere and lower atmosphere weather phenomena such as large cumulus conjestus clouds, thunderstorms, and tornadoes. The naval application of the research would be as a forecasting aid for the naval weather forecast.

The Faraday rotation of the 137 MHz signal from the application technology satellites (ATS) synchronous orbit is observed with a portable phase lock receiver to derive the IEC of the ionosphere. The IEC seems to be a sensitive indicator of certain cloud conditions, such as build-up of electrification, for example. Since the earth is bathed in the 137 MHz signal, it is usually possible to choose a line of observation to the satellite that passes above the cloud mass of interest.

Supporting agency address information: Office of Naval Research 465, Arlington, Va. 22217

SUPPORTED BY U.S. Dept. of Defense - Navy

5.0004, OPTICAL AERONOMY

J.F. NOXON, U.S. Dept. of Commerce, Environ. Research Laboratories, *Boulder, Colorado* 80302 (8DJ46572)

Project objective: Investigation of important problems in atmospheric composition, dynamics and energy budget using optical methods, primarily those involving measurements on atmospheric emission features.

Current year plan: Twilight airglow is used to measure the composition in the mesosphere and thermosphere and its changes. The wind field and temperature are studied by high resolution measurements of the Doppler shape and shift in emission lines originating near 100 and 300 km. Other investigations include optical effects associated with artificial heating of the ionosphere, infrared auroral studies from aircraft, intergalactic emission, earth-based measurements of Martian ozone, and rapid (approximately 1 hour) fluctuation in mesospheric temperature and density thought to result from gravity waves.

Progress report: Studies have been completed dealing with the theory of interferometers and with hitherto unrecognized contamination of Doppler temperature measurements by other airglow emission. A true twilight enhancement of the 5577 oxygen line has been identified as due to F region ionic recombination; variations in the 6300 oxygen line twilight have been shown to result from thermospheric oxygen variations associated with geomagnetic activity. Infrared Martian dayglow emission has been discovered and used to infer Martian ozone abundance by means of a new ground-based method. A twilight enhancement of molecular oxygen emission has been discovered and shown to yield terrestrial ozone measurements in the previously unmeasurable region above 90 km; the same emission in the nightglow

has revealed unexpectedly large and rapid fluctuations in atmospheric temperature near 100 km.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

5.0005, IONOSPHERIC STUDIES
T.E. VANZANDT, U.S. Dept. of Commerce, Environ. Research Laboratories, *Boulder, Colorado* 80302 (8DJ41451)

Project objective: Study of aeronomy in the ionosphere, particularly in the equatorial ionosphere, using data obtained at the Jicamarca Radar Observatory.

Current year plan: Study of the physical processes in the F-region airglow; study of the variations of neutral temperature in the equatorial thermosphere. Electron concentrations and electron and ion temperatures will be recomputed from raw data and made available to the World Data Center in a convenient form.

Progress report: Progress has been made in analyzing data from the 1966 solar eclipse at Jicamarca Radar Observatory; in analyzing atomic oxygen and atomic nitrogen nightglow data taken at Jicamarca Radar Observatory; in analyzing the variations of neutral temperature; and in recomputing the electron concentration and electron and ion temperatures from raw data.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

5.0006, PARTICLE AND WAVE STUDIES
E.C. WHIPPLE, U.S. Dept. of Commerce, Environ. Research Laboratories, *Boulder, Colorado* 80302 (8DJ41212)

Project objective: Study fundamental properties of gases and plasmas, particularly those properties important to understanding phenomena in the atmosphere.

Current year plan: Apply the basic kinetic equation for chemically reacting gases to problems in the upper atmosphere. Determine radiation line profiles from reaction products of exothermic reactions. Study the effect of chemical reactions on transport coefficients.

Progress report: The fundamental kinetic equation describing the interaction of chemically reacting gases has not been previously available because of the complexities introduced by the inelastic and reactive nature of the particle collisions. This equation has been derived and has been applied to the problems of determining the velocity distribution of reaction products. This work is believed to be a basic contribution to kinetic theory.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

5.0007, EVALUATION OF THE STORAGE MECHANISMS OF DIFFUSE SOURCES OF SALINITY IN THE UPPER COLORADO RIVER BASIN
S.A. SCHUMM, Colorado State University, School of Forestry, *Fort Collins, Colorado* 80521

The research proposed focuses on diffuse or natural sources of salt accumulations in tributary basins of the Upper Colorado River Basin. Investigations are aimed at identifying where natural salts are stored in the sub-basins and the relative importance of various basin deposits in accumulating salts. In addition, the release mechanism of these salts will be investigated by correlating the cycle of erosion of alluvial fill with salt release.

Field investigations will include a stratified random sample of various basin material (e.g., alluvium, terrace deposits, weathered bedrock, and bedrock). Electrical resistivity will be used to extend the sampling results.

The erosional histories of several basins will be obtained by aerial photography and field work. Basins will be selected on the basis of similar geology but with differences in amounts of natural salt release. Aerial photography will be obtained along the main channels of these basins at a scale of 1:12,000. Such detailed photography will allow the comparison between basins of the aggradation and degradation sequences along the main channels and will provide a method of correlating the erosion cycle with natural salt releases.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

5.0008, AURORAL ZONE RADIO PROPAGATION
A.N. LUNDBAK, Danske Meteorologiske Institut, *Copenhagan, Denmark* (AF-AFOSR-2161-72)

AF function - communications and radar. Deficiency - lack of knowledge of the auroral ionosphere yields communications outages and radar refraction errors. Research - provides observational data of ionospheric parameters from NARSSARSSUAQ Greenland. How research contributes - the results are used in statistical models of fading depth, total electron content and irregularity structure. This work expands the scope of contract F61052-69C-0019 to include operation of the AFCRL polarimeter and observation of the NOAA-1 satellite in addition to continuing observation of ATS-3. This increased scope provides more reliable measurement of total electron content and scintillation parameters referred to the sub-ionospheric latitude of ATS-3. Observation of NOAA-1 is used to investigate the movement of the scintillation boundary as a function of time and geomagnetic activity.

Supporting agency address information: AF Cambridge Research Laboratories LI, L.G. Hanscom Field, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

5.0009, ENVIRONMENTAL SUPPORT TECHNOLOGY - RESEARCH ON ATMOSPHERIC DYNAMICS - NUMERICAL WEATHER PREDICTIONS FOR NAVY OPERATIONS
H.J. MASTENBROOK, U.S. Navy, Research Laboratory, *Washington, District of Columbia* 20390

Improve the Navy capability for numerical weather prediction and weather modification by determining the distribution of atmospheric constituents which affect the radiative budget. Provide reference measurements for the assessment of climatic impact of navy aircraft and missile systems which pollute the stratosphere.

By means of balloon borne and aircraft instrument systems measure vertical and horizontal distributions of atmospheric trace constituents over an extended time period for time and space variability studies.

Supporting agency address information: Naval Research Laboratory (8000) Washington, D.C. 20375

SUPPORTED BY U.S. Dept. of Defense - Navy

5.0010, NAVY ENVIRONMENT - IMPROVEMENT OF NAVAL WEATHER FORECAST FOR IMMINENT CHANGE IN RAIN INTENSITY
H. HISER, Univ. of Miami, School of Marine Science, *Miami, Florida* 33149 (N00014-67-A-0201-0023)

The objective of this research is in behalf of the naval meteorologist to evolve forecasting procedures for precipitation in marine cloud masses based on data remotely sensed from a combined radar and sferics sensor and simultaneously displayed on a radar planned position indicator.

The precipitation echoes of clouds are surveyed and recorded with a ten centimeter radar. Simultaneously, the 500 KHz sferics emissions and the time rate of change of these sferics are also displayed and recorded. These data will be analyzed and examined for extent of correlation between rate of change of sferics and merger of separate radar echoes and also the effect of radar echo merging on rainfall and various side effects such as hail storms, wind storms, or tornadoes.

Supporting agency address information: Office of Naval Research, Arlington, Va. 22217

SUPPORTED BY U.S. Dept. of Defense - Navy

5.0011, WATER SOIL AND PLANT RELATIONSHIPS IN FOREST RESOURCE MANAGEMENT
J.T. MAY, Univ. of Georgia, Agricultural Experiment Sta., *Athens, Georgia* 30601 (GEO-0023-MS)

Objective: Determine the extent of surface area affected by heavy harvesting, site preparation and planting equipment and the effects on soil physical conditions, plant succession, ecology, and growth of tree seedlings; and study kaolin-mined areas to develop site preparation and fertilization practices that will favor the establishment and growth of vegetational cover and select and test plant species suitable for specific reclamation situations.

Approach: Aerial photos and line transects are used to determine areas affected by various harvesting and site preparation operations. Laboratory tests on core samples and on soil insitu will determine changes in soil physical properties. Effects on vegetation, including planted and direct-seeded pines, will be studied through paired plots with data taken at intervals up to 5 years. Grains, grasses, herbs and trees will be planted on kaolin-mined areas in blocks and pairs comparing fertilization and other treatments. Analysis will be made for major and minor elements. Plots will be maintained for 5 years for growth and survival data.

Progress: See sub-projects 23-A and 23-B.

SUPPORTED BY U.S. Dept. of Agriculture - C.S.R.S.

5.0012, THE EFFECTS OF URBANIZATION ON STREAM ECOSYSTEMS

A.C. BENKE, Georgia Inst. of Technology, Environmental Resources Center, *Atlanta, Georgia* 30332

The proposed research involves a field and laboratory investigation directed at the determination of how various land uses and watershed developments affect the quality of urban stream ecosystems. The primary indices of ecosystem quality will be species diversity and equitability of aquatic macroinvertebrates. Standard water quality determinations (DO, pH, temperature, etc.) also will be made.

Approximately 13 medium-sized watersheds (5-6 sq. mi.) will be selected for study in the Atlanta metropolitan area. They will range in degree of urbanization from relatively undisturbed watersheds to those containing high percentages of impervious surfaces. Several land use characteristics will be determined for each watershed from aerial photographs, including percent forest cover, percent paved roads, etc.

Artificial substrate samplers will be utilized in the periodic collection of stream macro-invertebrates. Several samplers will be placed in the streams for approximately six week intervals during different seasons. Species diversity and equitability will be calculated for each stream at each sampling date.

Multivariate analysis will be employed in correlating diversity, equitability, and water quality parameters (the dependent variables) with the various land use factors (the independent variables).

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

5.0013, INFILTRATION CHARACTERISTICS OF SELECTED HAWAIIAN URBAN LAND TYPES

Y. FOK, Univ. of Hawaii, Water Resources Research Ctr., *Honolulu, Hawaii* 96822

Problems: The effects of urban land use on infiltration and runoff have not been studied to the extent that the design of storm drainage system can fully account for such effects when the land is developed for urban use.

Objectives and approaches: 1. To select representative urban land use sites and determine the percentage of impermeable and permeable area of commercial, industrial, residential and recreational districts using aerial photographs. 2. To estimate the infiltration rate of the selected urban land use sites using soil survey maps. To verify the estimated infiltration rate by field measurements. To determine possible change of the infiltration rate after urbanization. 3. To estimate the peak discharge from the selected urban land use sites both before and after urbanization with consideration of percentage of impermeable area, infiltration rate, and change of topograph through terracing. 4. To summarize the result of this study to point out the possible effects of urbanization on infiltration and runoff, and to publish the findings in a final report.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

5.0014, INTERPRETATION OF METEOROLOGICAL SATELLITE DATA

T. FUJITA, Univ. of Chicago, School of Physical Sciences, *Chicago, Illinois* 60637 (04-4-158-1 MOD1)

Objectives: 1. To develop techniques and procedures for getting the satellite data into useful form for the meteorologist. 2. To use satellite data in conjunction with other meteorological data for gaining knowledge and understanding of the behavior and dynamics of mesometeorological systems, particularly thunderstorm complexes producing tornadoes and other severe weather such as heavy rains and hail. 3. To develop means of applying satellite data to the problem of very short range forecasts, i.e. 'nowcasting'.

Approach: Meeting those three broad objectives involves numerous and varied approaches, as follows: development of gridding, animation, and registration procedures necessary to accurately locate satellite data or to derive cloud motions from these data; assisting in the solution of various data problems that inevitably arise with each new satellite; special collections during severe weather events of ground truth data which are then used to develop better methods of utilizing seatellite data for determining characteristics of convective systems; application of satellite data interpretations gained in these studies to the 0 to 6 hour forecast problem.

Progress: Dr. Fujita has continued to develop his theory that the collapse of large convective penetrations through thunderstorm anvils may be related to the onset of tornadic activity at the ground.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

5.0015, CHANNEL MORPHOLOGY, STREAM POWER, AND SEDIMENT TYPES AS RELATED TO CHANNELIZATION AND RIVER TRAINING

W.N. MELHORN, Purdue University, Water Resources Research Ctr., *Lafayette, Indiana* 47907

Stream power incorporates the variables of slope and discharge and has a definite influence on the size and shape of the river channel. This project will investigate the relationship of these variables on channel dimensions. Specific objectives for the research are (1) define the relationships between stream channel morphology and stream power for differing bed and bank materials; (2) refine relationships developed in Objective 1 and thus develop a series of curves and nomographs which relate channel dimensions to stream power, discharge, and slope for a given bed and bank material type; and (3) determine the effects of channel alteration in a given stream reach to channel and drainage basin stability both above and below the reach in question. Data will be obtained from topographic maps and aerial photographs and in the field. In the field, variables such as channel width, depth, bar location, cross-section profile, and pool-riffle spacing will be measured. The research will be primarily devoted to streams in Indiana, but will also investigate data from the Mississippi and the High Plains states.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

5.0016, POSITIVE AND NEGATIVE ION REACTION STUDIES IN VARIOUS ATMOSPHERIC GASES

J.M. HEIMERL, U.S. Army, Ballistic Research Lab., *Aberdeen Proving Ground, Maryland* 21005

Accurate laboratory measurements of the rate constants for important ionospheric reactions.

Photoionization of gas contained in a 150-liter, cylindrical, all- metal chamber provides electrons and ions of known energy. differentially-pumped, monopole mass spectrometer and ancillary electronic equipment are used to measure the flux of positive or negative ions that diffuse through an orifice in the wall of the chamber. Rate constants are deduced from the decay of selected ion currents following a pulse of Lyman-alpha or krypton resonance radiation. When reversible reactions occur in times that are short compared to diffusion time constants, computer codes are utilized to compute the reaction rate constants.

Supporting agency address information: AMC Ballistic Research Labs, Aberdeen PG, Md. 21005

SUPPORTED BY U.S. Dept. of Defense - Army

5.0017, RESEARCH IN ATMOSPHERIC SCIENCES/AERONOMY/ATMOSPHERIC MODELING

F.E. NILES, U.S. Army, Ballistic Research Lab., *Aberdeen Proving Ground, Maryland* 21005

To determine and understand the atomic and molecular reaction processes which occur in the upper atmosphere under conditions of (1) normal diurnal and seasonal variations, (2) natural atmospheric disturbances, (3) disturbances caused by nuclear weapons, and (4) disturbances caused by missile reentry; to model the physical and chemical processes theoretically in the form of computer codes, and to utilize the computer codes to describe and to predict atmospheric changes affecting Army systems. Paragraph 9 of the Army qualitative research requirements for nuclear wepons effects information (GRR) documents the requirements for this work in connection with the development of the Army BMD and other missile systems.

Computer codes have been and are being developed to model the following- (1) the chemistry of the upper atmosphere subjected to varying conditions, (2) the chemistry occurring in laboratory facilities, and (3) the physical processes occurring in laboratory facilities used to obtain information about atmospheric reactions.

Supporting agency address information: AMC Ballistic Research Labs, Aberdeen PG, Md. 21005

SUPPORTED BY U.S. Dept. of Defense - Army

5.0018, STRATOSPHERE ANALYSIS FOR NAVAL WEATHER OPERATIONS

F. FINGER, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin., *Rockville, Maryland* 20852

To define the structure and circulation of the upper atmosphere, and the coupling of this region with the troposphere; and to derive applications to forecast models and various aerospace vehicles for naval operations.

Employment of statistical analyses of stratospheric data will serve as a guide in determining the best use of the data. Use of theoretical considerations in numerical modeling of the stratosphere and in computations of stratospheric energy budgets will provide the ability to: (1) determine the compatibility between radiosonde data (including humidity) as reported by various instruments throughout the northern hemisphere, (2) determine the compatibility between temperature and heights derived from satellite radiance values and the same parameters reported by the world-wide radiosonde network, (3) derive first-guess height-and temperature-fields from satellite radiation and rocket data for upper stratosphere, (4) employ analytical methods in studying various atmospheric models, in an attempt to discover the cause of stratospheric warnings, and (5) computer energy and momentum budgets for the stratosphere.

Supporting agency address information: Naval Air Systems Command 5401A1 Washington, D.C. 20361

SUPPORTED BY U.S. Dept. of Defense - Navy

5.0019, SCATTERING PROFILES

L. ELTERMAN, U.S. Air Force, Cambridge Research Labs., *Bedford, Massachusetts*

AF function - target acquisition and tracking, reconnaissance. Deficiency - the design engineer for electro-optical systems needs atmospheric models for light attenuation which he can use to determine boundary conditions for optimal and minimal performance of reconnaissance or other military systems. Research - balloon and remote ground measurements of the vertical profile of light attenuation properties and correlation of the results with theoretical concepts to derive atmospheric models for light transmission. How research contributes - provides representative model atmospheres for 'good' and 'bad' seeing conditions, which can be employed to predict and evaluate the restrictions of the natural atmosphere on the performance of optical military systems and the dependence of the restrictions on altitude, wavelength, and systems geometry. To measure attenuation properties of the lower and upper atmosphere up to 35 km, and determine the vertical variation and structure of the optical parameters. This is done by searchlight backscattering measurements and in situ balloon measurements. Results are transformed into model atmospheres for light transmission computations for any optical path through the atmosphere and, therefore, are applicable to a wide variety of military operational problems.

Supporting agency address information: AF Cambridge Research Laboratories OP L.G. Hanscom Field, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

5.0020, SOLAR WIND-GEOMAGNETIC FIELD INTERACTIONS

P.F. FOUGERE, U.S. Air Force, Cambridge Research Labs., *Bedford, Massachusetts*

AF function - satellite control, tracking, and cataloging. Deficiency - outbursts of solar plasma interact with the earth's atmosphere to cause perturbing drag on satellites. This drag complicates satellite operations. Research - study solar plasma-geomagnetic field interactions. How research contributes - a better understanding of how the solar wind plasma interacts with the earth's environment will assist in improving satellite orbit predictions and determinations. The objective of this work is to develop theoretical models of the interactions between the solar wind and the geomagnetic field for the purpose of better understanding observed phenomena relating to the physics of the magnetosphere, and to develop prediction schemes for high levels of geomagnetic activity. Approach is to utilize (1) the observation that magnetic activity increases within two days of the time when an interplanetary magnetic sector boundary passes the earth, and (2) the expectation that sector boundary passage can be predicted about four and one-half days in advance.

Supporting agency address information: AF Cambridge Research Laboratories PH L.G. Hanscom Field, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

5.0021, ULTRASENSITIVE PROBING OF ATMOSPHERIC STRUCTURE

K.R. HARDY, U.S. Air Force, Cambridge Research Labs., *Bedford, Massachusetts*

AF function - all-weather operation of aerospace vehicles, avoidance of atmospheric danger zones. Deficiency - inability to detect and identify hazardous zones remotely. Research - employ advanced ultrasensitive radar for probing regions of the clear air and precipitation. How research contributes - provides remote techniques for identification of hazardous flight conditions. The objective of this work is to devise, investigate, and develop new ideas and techniques for the indirect probing of the atmosphere. Current work is directed toward the investigation of the use of ultrasensitive radars at various wavelengths for the definition of the precipitation environment for supersonic vehicles. Advanced radar technique and direct aircraft probes are used to identify and investigate the nature of the clear and cloudy atmosphere. Extensive experimental and theoretical studies are conducted in order to relate the radar signal characteristics to the scattering mechanisms and to the structure of storm systems.

Supporting agency address information: AF Cambridge Research Laboratories LY L.G. Hanscom Field, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

5.0022, COMPOSITION MEASUREMENTS FOR USAF SYSTEMS

R.S. NARCISI, U.S. Air Force, Cambridge Research Labs., *Bedford, Massachusetts*

AF function - nuclear weapons delivery, satellite operations, communications, detection, track and intercept. Deficiency - missile trajectories, satellite orbits, radio wave transmission, and radar track capability cannot be reliably predicted especially following nuclear detonation or solar flares. Research - measurements of variations of atmospheric gas density profiles (neutral and ion) under known radiation flux conditions. How research contributes - knowledge of atmospheric environments will aid in orbit predictions, missile impact predictions, and frequency selection for reliable communications and radar track. Rocket and satellite borne mass spectrometers measure the composition and density of positive ions, negative ions and neutral gases in the communications and radar blackout regions (50 to 300 km) and at USAF operational satellite altitudes (90 to 300km). Measurements are performed during quiet conditions and solar flare disturbances when ionization is created by solar protons, electrons or x-rays. These data are used to develop predictive models

for the nuclear disturbed environments and for selection of polar long range communications frequencies. Neutral atmosphere measurements provide the data to develop models for AF operational satellite altitudes.

Supporting agency address information: AF Cambridge Research Laboratories LK L.G. Hanscom Field, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

5.0023, GLOBAL MORPHOLOGY OF TOPSIDE IONOSPERE
R.C. SAGALYN, U.S. Air Force, Cambridge Research Labs., *Bedford, Massachusetts*

AF function - satellite position predictions, missile detection and surveillance, prediction of persistence of nuclear weapons effects. Deficiency - inadequate knowledge of the spatial and temporal distribution of environmental ion and electron temperatures and densities in the topside ionosphere results in significant errors in satellite prediction and inflight missile location and inability to predict the duration of nuclear weapon effects. Research - the objective of this work is to process and analyze charged particle measurements obtained on the polar orbiting satellites INJUN V and ISIS I between the altitude of peak charge density in the f region and 3500 km. Seasonal, diurnal, altitudinal and geophysical variations of temperature and density will be established. The influence of solar-magnetic disturbances on these properties will be assessed. The results will provide new knowledge of the relative importance of diffusion of the plasma along magnetic field lines and electrodynamic drifts in determining the spatial variation of environmental charged particles. How research contributes - the results of this work can be directly applied to both analytical and empirical models of electron density distributions required for the calibration of communication systems and in locating, tracking and guiding satellites and missiles.

Supporting agency address information: AF Cambridge Research Laboratories PH L.G. Hanscom Field, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

5.0024, INFRARED SPECTROMETRIC APPARATUS
G.A. VANASSE, U.S. Air Force, Cambridge Research Labs., *Bedford, Massachusetts*

AF function - surveillance, target detection, reconnaissance and communication. Deficiency - lack of detailed knowledge about the infrared radiation environment a military system will function in. Research - development of more efficient spectrometric techniques for carrying out infrared measurements of atmospheric transmission and background emission. How research contributes - permits more rapid measurement of infrared radiation from night sky emission, airglow, aurora, cool stars, atmospheric backgrounds and/or of transient phenomena at high spectral resolution. Permits ultra-high resolution laboratory measurements of spectral line positions and strengths of atmospheric emitters and absorbers. Detailed knowledge of atmospheric transmission and background emission is required in order to optimize the design and performance of military weapon, detection and communication systems. The research will yield data which will be incorporated into the LOTRAN and HITRAN transmission codes.

Supporting agency address information: AF Cambridge Research Laboratories OP L.G. Hanscom Field, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

5.0025, THEORETICAL STUDIES OF SOLAR TERRESTRIAL RELATIONS
M.L. WHITE, U.S. Air Force, Cambridge Research Labs., *Bedford, Massachusetts*

AF function - communications - detection. Deficiency - inability to cope with disruptions in communication and detection systems due to ionospheric plasma variations induced by solar activity. Research - conduct theoretical investigations of wave propagation and transport phenomena in magnetoplasmas such as found in the solar-terrestrial environment. How research contributes - improves AF ability to predict and explain ionospheric disruptions to communications and detection systems. One aspect of this research is an attempt to develop a generalized magnetoionic theory of electromagnetic wave propagation through weakly ionized gases. Such a theory is applicable to communications transmission in the lower ionosphere. In intermediate levels of the ionosphere, the theoretical studies to explain normal and disrupted communication behavior are concerned with ionized magneto- plasmas. A theory is being developed to explain development of communications disrupting solar flares at specific solar latitudes. Such a theory will aid the AF in its efforts to predict the occurrence of flares which disturb the ionosphere and hence communication and detection systems. Additional theoretical work is pursued in an effort to improve the AF prediction capability of ionospheric irregularities related to corpuscular and electromagnetic radiation from solar flares, as well as to explain the origin of electric fields in the ionosphere and magnetosphere. Such electric fields are closely related to disruptive effects on communications and detection systems in the polar ionosphere.

Supporting agency address information: AF Cambridge Research Laboratories PH L.G. Hanscom Field, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

5.0026, IONOSPHERIC PREDICTION TECHNIQUES
M.S. WONG, U.S. Air Force, Cambridge Research Labs., *Bedford, Massachusetts*

AF function - communication and detection. Deficiency - inability to predict the state of the ionosphere and ionospheric propagation parameters. Research - develop a method for short-term prediction of ionospheric absorption. How research contributes - specifying and forecasting the state of the ionosphere is a requirement of the air weather service. Develop a method of short-term prediction, up to 24 hours ahead, on absorption (in decibels) of radio waves over high- latitude radio propagation paths during the course of polar-cap- absorption (PCA) events caused by influx of solar protons into the earth's ionosphere. Input data for the prediction will consist of absorption measured by vertical-incidence riometers at high-latitude stations, radio burst characteristics of the solar flare (when identifiable) causing the PCA event, and atmospheric pressure data for the ionospheric D region. Assistance is also rendered to the air weather service in exploring and assessing possible methods for short-term prediction on the lowest usable frequency (LUF) for propagation paths at middle latitudes.

Supporting agency address information: AF Cambridge Research Laboratories LI L.G. Hanscom Field, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

5.0027, UPPER ATMOSPHERE PROPERTIES
S.P. ZIMMERMAN, U.S. Air Force, Cambridge Research Labs., *Bedford, Massachusetts*

AF function - advanced aerospace vehicles, target acquisition, weapons delivery. Deficiency - during upper atmosphere storm conditions and following nuclear detonations, missiles and satellites can be lost from radar surveillance and radio communications can be interrupted. Research - development of more accurate models of the normal and disturbed atmosphere. Determination from data of systematic variations in atmospheric physical properties including turbulence. How research contributes - improved models of atmospheric properties including temperature, density, pressure and winds are developed. Studies will be made of the effects on atmospheric models of transport processes such as wind shears, diffusion, turbulence, wave propagation and energy dissipation. Improved models can be used for more accurate prediction of missile trajectories and satellite ephemerides and of the conditions under which they can be tracked by radars and communicated with for command and control functions.

Supporting agency address information: AF Cambridge Research Laboratories LK L.G. Hanscom Field, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

5.0028, REDUCTION AND UTILIZATION OF ENERGETIC PARTICLE DATA
M.P. HAGAN, Emmanuel College, Graduate School, *Boston, Massachusetts* 02115 (F19628-73-C-0190)

AF function - communications and surveillance. Deficiency - insufficient knowledge of space environment. Research - organize and apply particle data. How research contributes - maps and monitors interaction of energetic particles with earth's magnetic field. Satellites will produce large amounts of data on trapped particles. Herein methods will be developed and applied to reduce these data and apply them to the modeling of significant phenomena.

Supporting agency address information: AF Cambridge Research Laboratories PH L.G. Hanscom Field, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

5.0029, SATELLITE BEACON STUDIES
M.P. HAGAN, Emmanuel College, Graduate School, *Boston, Massachusetts* 02115 (F19628-72-C-0305)

AF function - communication, navigation and detection systems. Deficiency - the effects of ionospheric irregularities reduce reliability of communication systems and cause errors in determining position and range. Research - determine geographical dependence of ionospheric irregularities which produce amplitude fluctuations and variations in total electron content. How research contributes - forecast effects on communication systems (AFSATCOM) and navigation systems (GPS). The research will concentrate on analyzing signal strength and TEC records from several sites ranging from the auroral to equatorial region to determine the latitude dependence of irregularities. The ionospheric irregularities which occur at F-layer heights cause amplitude scintillations and variations in TEC which reduce the reliability of communication systems and cause errors in the determination of range and position. The objective of the research will be to produce a model of the irregular ionosphere which will allow systems designers to forecast and compensate for degradation in performance.

Supporting agency address information: AF Cambridge Research Laboratories LI L.G. Hanscom Field, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

5.0030, IONOSPHERIC MODELLING
R.L. CAROVILLANO, Boston College, School of Arts, *Chestnut Hill, Massachusetts* 02167 (F19628-74-C-0015)

AF function - ionospheric modelling. Deficiency - inability to estimate effects of auroral substorms on radio propagation systems. Research - to formulate a model of auroral substorm effects upon ionospheric structure. How research contributes - this research will provide a practical model, based primarily on physical principles, which describes in quantitative terms the changes in ionospheric structure accompanying auroral substorms. By coordinating ionospheric, optical and magnetic manifestations of substorms and formulating the results in a computer program, the resulting model will be directly applicable to real-time management of radio propagation systems, such as OTH radars, at high latitudes.

Supporting agency address information: AF Cambridge Research Laboratories LI L.G. Hanscom Field, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

5.0031, DEVELOP AND IMPLEMENT MATH TECHNIQUES AND COMPUTER ROUTINES TO ANALYZE DATA TELEMETERED FROM ROCKET PROBES
R.J. MARCOU, Boston College, School of Arts, *Chestnut Hill, Massachusetts* 02167 (F19628-73-C-0133)

AF function - communications, surveillance and navigation in the polar regions. Deficiency - lack of definitive knowledge of polar disturbed ionospheres for possible circumvention. Research - analysis of experimental data from polar rockets flown through various categories of disturbed ionosphere. How research contributes - augments knowledge on the prognostication of radio wave propagation in polar regions. Data collected from rocket flown experiments (e.g., probes of the electron and ion density, temperature, electron energy distribution, vehicle potential) in the D and E - ionospheric regions during disturbed conditions (e.g., polar ionosphere) is analyzed, resulting in the tabulation of the critical parameters and from which advanced analysis can be made (along with plots and digital tapes of first order data analysis).

Supporting agency address information: AF Cambridge Research Laboratories SU L.G. Hanscom Field, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

5.0032, NAVY ENVIRONMENT - ADVANCE CLUES TO WEATHER CHANGE
D.E. OLSON, Univ. of Minnesota, School of Liberal Arts, *Duluth, Minnesota* 55812 (N00014-67-A-0113-0023)

The objective of this research is to detect the initial atmospheric response to certain solar events and then to follow that response in search of advance clues (greater than 48 hours) of change in weather. The naval application of the research would be to better advance planning for weather dependent naval operations.

During various weather situations, simultaneous observations of the atmospheric columnar electrical resistance and the maximum va'ue of the electrical field at ground level are made. There is a special effort to make such observations during aurora because the aurora so clearly marks a solar event.

Supporting agency address information: Office of Naval Research 465, Arlington, Va. 22217

SUPPORTED BY U.S. Dept. of Defense - Navy

5.0033, AIRPHOTO INTERPRETATION OF THE FORM AND BEHAVIOR OF ALLUVIAL RIVERS 8623-EN
J.C. BRICE, Washington University, School of Arts, *St. Louis, Missouri* 63130 (DA-ARO(D)-31-124-70-G89)

To study river classification and the prediction of river behavior. The Army stands in need of being able to predict stream channel properties and also channel behavior on the basis of air photographs and obtainable general background information relating to environmental factors and conditions. These characteristics are directly relevant to Army operational possibilities in an area, as mobility is much affected by the nature of alluvial valleys and their channels.

Rivers in the United States and Canada will be studied by a detailed airphoto study of the form properties of about 100 river reaches ranging from 100 to 15,000 cubic feet per second in diverse climatic and geologic settings. Channel shift and other aspects of behavior during the past 25-30 years will be measured and related to the form properties.

Supporting agency address information: OCRD Research Office - Durham, Durham, N.C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

5.0034, COMMUNICATIONS - RADIO WAVE PROPAGATION THROUGH TURBULENT IONIZED MEDIA
N. MARCUVITZ, Polytechnic Inst. of New York, School of Engineering, *Brooklyn, New York* 11201 (N00014-67-A-0438-0016)

To solve problems of communications and propagation of electromagnetic energy through nonlinear and turbulent media such as encountered in the ionosphere, atmosphere, and other general dielectric media.

Techniques of seeking solutions of stochastic waves in ionized media will continue to be sought, with particular attention to the self- consistent description of turbulent wave processes in spatially inhomogeneous and time varying plasma systems.

Supporting agency address information: Office of Naval Research 427, Arlington, Va. 22217

SUPPORTED BY U.S. Dept. of Defense - Navy

5.0035, USE OF MULTISPECTRAL PHOTOGRAPHY IN WATER RESOURCE PLANNING AND MANAGEMENT IN NORTH CAROLINA

C.W. WELBY, Univ. of North Carolina, School of Agriculture, *Raleigh, North Carolina* 27607

The basic objective of this investigation is determination of the extent to which multispectral photography is useful in North Carolina water resource planning and management. A four lens multispectral camera will be flown over various test sites to evaluate its use in water pollution monitoring, in studying of flooding along streams, and in evaluation of sediment distribution in lakes and estuaries. Attention is to be given to the cost-effectiveness of the method.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

5.0036, AIRBORNE DETECTION OF AEROSOLS

N.A. ENGLER, Univ. of Dayton, School of Arts, *Dayton, Ohio* 45409 (F19628-72-C-0356)

AF function - reconnaissance, communications, surveillance guidance, target acquisition and tracking. Deficiency - the performance of optical systems observing through the atmosphere is significantly degraded by light scattering and absorption and is a variable complex function of the atmosphere in the theatre of operation. Research - aircraft instrumentation for measurements of atmospheric particulates to 70,000 feet altitude. How research contributes - the design and development of this instrumentation will provide the proper aerodynamic configuration and support for very sensitive measurements of the distribution of atmospheric aerosols at aircraft operational altitudes. Results from these flights will provide direct input data for theoretical modeling of the atmosphere as an optical transport medium. Such theoretical programs are important for the calculation of atmospheric optical effects on specific electrooptical systems under given operating conditions.

Supporting agency address information: AF Cambridge Research Laboratories OP L.G. Hanscom Field, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

5.0037, LAND USE CHANGES AND RESERVOIR DEVELOPMENT - AN APPLICATION OF LAND USE INFORMATION SYSTEMS

J.F. ROONEY, Okla. St. Univ., School of Arts, *Stillwater, Oklahoma* 74075

The purpose of the research is to extend knowledge regarding the impacts of investments in water resources projects. In addition, a land use information system will be tested to determine its utility in extending this knowledge. Specifically, the following objectives will be accomplished: 1. Types of changes in land use associated with the development of Keystone Reservoir will be measured; 2. The extent of such changes will be measured; 3. the variables which are relevant in stimulating such land use changes will be identified; 4. A model which predicts such changes will be developed and tested; 5. The land use information system used in this research will be evaluated in order to ascertain its utility in assessing land use impacts from reservoir development.

The study region is located in central Oklahoma. Aerial photographs will be used as a source of land use information for three different time periods. Land use information will be stored in such a form as to be readily retrieved and analyzed.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

5.0038, ATMOSPHERIC ION/NEUTRAL DENSITY MEASUREMENTS

M.A. BIONDI, Univ. of Pittsburgh, School of Arts, *Pittsburgh, Pennsylvania* 15213 (DA-31-124-ARO(D)-440)

To determine the composition of the neutral and ionized atmosphere, D, E and F(1) regions, particularly in the auroral and polar regions, and to identify the excitation and ionization processes occuring during auroras and PCAs. The direct, major application for the results of this research are nuclear simulation, atmospheric modification, nuclear interference and nuclear blackout.

Instruments such as mass spectrometers, photometers and particle detectors are carried on sounding rockets into auroras, PCAs and the quiet atmosphere.

Supporting agency address information: AMC Army Research Office ARO-D, Durham, N.C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

5.0039, COMPOSITION OF THE MESOSPHERE AND LOWER THERMOSPHERE - P.A.S.I. 6563

M.A. BIONDI, Univ. of Pittsburgh, School of Arts, *Pittsburgh, Pennsylvania* 15213 (DA-31-124-ARO(D)-440)

To calculate the composition of the atmosphere from 50 to 120 km as functions of time, latitude and seasons. The direct, major application for the results of this research are nuclear simulation, atmospheric modification, nuclear interference and nuclear blackout.

Chemistry, dissociative fluxes, transport rates are taken into account in time-dependent calculation of densities of major and minor species.

Supporting agency address information: AMC Army Research Office ARO-D, Durham, N.C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

5.0040, OPTICAL MASS SPECTROMETER FOR MESOSPHERIC MEASUREMENTS OF O, N, O2 AND N2 - P.A.S.I.

M.A. BIONDI, Univ. of Pittsburgh, School of Arts, *Pittsburgh, Pennsylvania* 15213 (DA-31-124-ARO(D)-440)

To measure the absolute densities in the mesosphere. The direct, major application for the results of this research are nuclear simulation, atmospheric modification, nuclear interference and nuclear blackout.

An instrument has been designed which is free of the problems normally encountered with conventional mass spectrometers- it will be used during this study.

Supporting agency address information: AMC Army Research Office ARO-D, Durham, N.C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

5.0041, CHEMICAL REACTIONS, RADIATIVE AND ENERGY TRANSFER PROCESSES OF IMPORTANT ATMOSPHERIC SPECIES 10407-C

F. KAUFMAN, Univ. of Pittsburgh, School of Arts, *Pittsburgh, Pennsylvania* 15213 (DA-ARO(D)-31-124-72-G89)

To investigate problems associated with upper atmosphere phenomena- -elementary reaction kinetics, energy transfer, excitation, and chemiluminescence. The results which emanate from this research have potential application to a variety of Army problems associated with high altitude environments such as reentry phenomena, communications, and atmospheric modification.

Research topics will include- kinetic studies of some spin-forbidden reactions, reaction of n(2p), oscillator strength of a forbidden oi transition, reactions of water cluster ions with atomic species, kinetics of some OH reactions, temperature dependence of NO2 fluorescence, and infrared chemiluminescence.

Supporting agency address information: OCRD Research Office Durham, Durham, N.C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

5.0042, INTERDISCIPLINARY APPLICATIONS AND INTERPRETATIONS OF REMOTELY SENSED DATA

G.W. PETERSEN, Penn. State University, Agricultural Experiment Sta., *University Park, Pennsylvania* 16802 (PEN01998)

Objective: Develop a background in processing and interpretation of the type of data that will be available from the two Earth Resources Technology Satellites and Earth Resources Experimental Package on SKYLAB.

Approach: Data interpretation and analysis will be conducted ranging from photo interpretation to various forms of computer processing. Initially this will involve nine bands of multi-spectral scan imaging data covering 0.38 to 1.0 microns and one band of infrared imaging data covering 8 to 13 microns along

with a 70 mm tracking color stereo photo set. The flight line is one for which extensive ground truth is readily available and which contains wide variations in vegetation, soils and geological formations.

Progress: Remote sensing activities at The Pennsylvania State University have been coordinated through the Office for Remote Sensing of Earth Resources (ORSER), which is an interdisciplinary group. An extensive operational capability has been developed for processing, interpreting, and analyzing of remotely sensed multispectral data. A data processing system has been developed that is capable of producing statistical information, performing pattern recognition routines, and generating other types of analyses of remotely sensed data. Character maps are produced by each component of the system. Line maps corresponding to any character map can be produced to a given scale without scanner or character map distortions. Three NASA aircraft remote sensing flights were planned and coordinated over Pennsylvania. These data along with the ERTS data were used to ascertain the usefulness of ERTS data in the areas of natural resources and land use inventory, geology and hydrology, and environmental quality. Specific results include a study of land use in the Harrisburg area, discrimination between types of forest resources and vegetation, detection of previously unknown geologic faults and correlation of these with known mineral deposits and ground water, mapping of mine spoils in the anthracite region of eastern Pennsylvania, and mapping of strip mines and acid mine drainage in central Pennsylvania. Both photointerpretive techniques and automatic computer processing methods have been developed and used, separately and in a combined approach.

SUPPORTED BY U.S. Dept. of Agriculture - C.S.R.S.

5.0043, AIRBORNE LASER SYSTEM FOR OCEAN SURFACE MEASUREMENTS

K.J. PETRI, U.S. Navy, Aero Electron Tech. Dept., *Warminster, Pennsylvania* 18974

To determine the feasibility of utilizing a laser to measure ocean surface wave height and ocean surface wind velocity from a Navy surveillance aircraft.

A continuous wave laser (1060 nanometer wavelength) with associated optics will be used to determine ocean surface wave heights and ocean surface wind velocity by scanning areas from a fixed platform and then from a surveillance aircraft.

Supporting agency address information: Naval Air Systems Command 370C Washington, D.C. 20361

SUPPORTED BY U.S. Dept. of Defense - Navy

5.0044, USES OF AERIAL PHOTOGRAPHS IN VARIOUS FORESTRY ACTIVITIES

W.A. SHAIN, Clemson University, Agricultural Experiment Sta., *Clemson, South Carolina* 29631 (SC00004-FR)

Objective: Develop keys for identifying tree species on aerial photographs. Construct aerial volume tables for selected timber species in South Carolina. Develop from aerial photographs management aids in the form of specialized topographic maps, vegetation maps, and stand delineation maps. Develop methods of measuring the influence of forest waters - surface runoff, standing surface water, and soil moisture - on the silvicultural characteristics of the forest.

Approach: Aerial photographs - panchromatic, infrared, color, and color infrared - will be used at selected scales during the autumn, winter, and spring seasons. Dichotomous keys will be used, utilized in tree identification. Electronic data processing machines will help reduce the field data of aerial volume tables. Sample plots located and measured on both the ground and the aerial photographs will supplement work on water levels, delineation maps, and aerial volume tables.

Progress: Completed a thesis on 'An Investigation of the Understory Vegetation in Size Classification on the Hobcaw Forest.' A manuscript is being prepared from this thesis data for publication. Continued work on a thesis 'The Fluctuation of Surface Water Levels and Their Effect on the Vegetation and Forest Management on the Hobcaw Forest.'

SUPPORTED BY U.S. Dept. of Agriculture - C.S.R.S.

5.0045, AIR POLLUTION - JP-4 FUEL DUMP

R. DAWBARN, Aro Incorporated, *Tullahoma, Tennessee* 37389 (F40600-74-C-0001)

Supply information to determine the impact on the environment when JP-4 fuel is jettisoned from jet planes.

The approach will be in three sequential phases. (1) A comprehensive literature survey to define the range of chemical and physical properties of JP-4, the disposal and evaporation of the fuel subsequently to its injection into the atmosphere, and the state of the art in determining the impact on the photochemical reactions already occurring in the atmosphere. (2) An experimental program to supplement the available information on droplet breakup and evaporation. (3) A study of the physical effects of JP-4 on the normal atmospheric processes of condensation and evaporation of water.

Supporting agency address information: Arnold Engineering Development Center Arnold AFS, TN 37389

SUPPORTED BY U.S. Dept. of Defense - Air Force

5.0046, ENVIRONMENTAL EVALUATION OF WATER RESOURCES DEVELOPMENT

W.P. JAMES, Texas A & M University System, School of Engineering, *College Station, Texas* 77843

The objectives of the study are to identify ecological changes associated with water resources project facilities or activities, to develop procedures for inventory of critical environmental elements, and to present methods to evaluate alternatives and assess the impact of water resources development on the environment. The goal of this study is to establish rapid, low-cost procedures for conducting the environmental assessment. Aerial photography and photographic interpretation techniques will be utilized in the study to develop methodology for the identification and inventory of critical environmental elements. Airphoto pattern elements will be developed for the primary landforms for 12 regions of Texas, three typical sites within each of the 12 regions will be evaluated. Methods of sample stratification, number and location of field sample plots and use of identification keys will be demonstrated.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

5.0047, TROPICAL, MID AND HIGH LATITUDE STUDIES OF SELECTED AIRGLOW EMISSIONS

B.A. TINSLEY, Univ. of Texas, Graduate School, *Dallas, Texas* 75230

A research program will be carried out to continue the ground based measurements and related theoretical studies of emissions from oxygen, helium and hydrogen in the twilight and night sky, using as basic instruments two grille spectrometers, supplemented by filter wheel photometers. The grille spectrometers are at present located in College, Alaska, and Huancayo, Peru.

The studies will be oriented towards (1) The understanding of excitation by photoelectrons, both locally and after travelling from the conjugate point. The measurements will be compared with a computer model of the local and conjugate photoelectron production and transport effects and corresponding production of optical emissions studies; (2) The evaluation of diurnal changes in helium abundance, particularly the anomalous effect of greater abundances in morning twilight than in evening twilight. This is contrary to the expectation from static diffusion models of thermospheric composition; (3) The effect of winds in redistributing ionization in the tropical F region, and the analysis of diurnal and seasonal changes in the F region wind component perpendicular to the magnetic equator; (4) Analysis of the solar cycle variations of atomic hydrogen, from the extended data sets now available of Balmer alpha and Lyman alpha emissions, using new Skylab data on the solar Lyman beta profile and a better T model; (5) Theoretical analysis of effects important in determining the diurnal variation in exospheric hydrogen; (6) Measurements in conjunction with the Geophysical Institute at the University of Alaska utilizing the optical instruments as well as the Chatanika Backscatter Radar facility for a study of the F region trough and other auroral phenomena.

SUPPORTED BY U.S. Natl. Science Foundation

5.0048, COMMUNICATIONS - WAVE AMPLIFICATION AND PARTICLE PRECIPITATION AT ULF-ELF
H.B. LIEMOHN, Univ. of Washington, School of Arts, *Seattle, Washington* 98105 (N00014-73-C-0333)

The objective is to evaluate the effect of the ionosphere on radio communication systems used in Navy operations and to help in the design and operation of such systems. The propagation and attenuation of high- frequency, very low-frequency, and very high-frequency radio signals by the ionosphere, from both ground-based and satellite transmitters, are governed by the electron and ion densities in the ionosphere. The present work will examine the possibility of the enhancement of radio signals by artificially injecting plasma into the magnetosphere.

Work will consist of a study of the injection conditions, including the effects of source location, ambient conditions, altitude, and plasma pause situation in terms of beam density, particle energy, and pitch angle. An evaluation will be made of ULF-ELF wave amplification for selected injection and indigeneous conditions in the magnetosphere. ULF- ELF propagation will be examined in terms of the distribution of wave- normals in amplified signals, mode-coupling, wave-guide effects, and noise sources.

Supporting agency address information: Office of Naval Research 421, Arlington, Va. 22217

SUPPORTED BY U.S. Dept. of Defense - Navy

5.0049, NAVY ENVIRONMENT - STRATOSPHERIC AEROSOLS SAMPLING PROGRAM
J.M. ROSEN, Univ. of Wyoming, School of Arts, *Laramie, Wyoming* 82070 (N00014-70-A-0266-0002)

The immediate objective of this research is to determine reference levels of particulate matter, water vapor and ozone in the stratosphere within 500 miles of a mature hurricane for the purpose of improving the Navy's capability in the area of stratospheric vehicle operation, weapon delivery, and vehicles/weapons detection systems.

This research involves a program of stratospheric monitoring of particulate matter by balloon-borne sensors within 500 miles of a mature hurricane so that a statistically significant natural baseline and/or trend can be established. Observations will be accomplished utilizing in-site ruggedized sounding units which have been fabricated. Direct sampling will provide qualitative and quantitative comparative information between data collected near the hurricanes and data obtained from eight stations located around the globe (ONR Contract N00014-70-A- 0866-0005). Under this no-funds extension the principal investigator will utilize a storm from the 1973 hurricane season to obtain appropriate samples.

Supporting agency address information: Office of Naval Research 421, Arlington, Va. 22217

SUPPORTED BY U.S. Dept. of Defense - Navy

LIFE SCIENCES

Includes Life Sciences (general); Aerospace Medicine; Behavioral Sciences; Man/system Technology and Life Support; and Planetary Biology.

6.0001, INVESTIGATION OF MATHEMATICAL TECHNIQUES AND TRIALS-TO-CRITERION AS PROFICIENCY MEASURES FOR ASUPT
W.L. WAAG, U.S. Air Force, Human Resources Laboratory, *Chandler, Arizona* 85224

To investigate: 1. The potential of several mathematical analysis techniques to quantify flying proficiency as it is defined by the aircraft flight path, 2. The utility and precision of trials-to-criterion as a measure of flying skill, and 3. The validity of specific measures of proficiency in terms of their capability to differentiate between beginning and advanced pilots. The pilot proficiency measurement system which results will be integrated with the ASUPT and utilized during the ASUPT research program.

The flight path is treated as a mathematical function. A student pilot's proficiency is evaluated by obtaining measures based on deviations from the ideal flight path. Two approaches will be investigated- first, continuous measurement of deviations about the ideal flight path, and second, the measurement of deviations on selected parameters at discrete key positions in the maneuver. The latter approach will make use of instructor judgments regarding critical maneuver segments and the relative importance of selected parameters.

Supporting agency address information: AF Human Resources Laboratory, FT. Williams AFB, Arizona 85224

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0002, EFFECTS OF PARACHUTING AND PERSONAL PROTECTIVE EQUIPMENT ON SEVERAL RESPIRATORY FUNCTIONS
J.O. BALDOCK, U.S. Navy, Aerospace Recovery Facil., *El Centro, California* 92243

To determine the effect of an acute stress, parachuting, on carbon dioxide production oxygen consumption, respiratory volumes, and respiration rates.

Respiratory rates and volumes will be measured with transducers that are consistent with the constraints of parachuting safety and the fm/fm telemetry multi-channel data acquisition system currently in use at this facility. A respiratory gas collection system that can withstand the rigors of parachuting and not compromise safety will be developed. The samples collected will be analyzed with a medical mass spectrometer. Three phases of this study have been planned at this time. Phase I: The test subjects will be 'baselined' in resting and maximal exercise conditions with and without parachuting gear, and at rest in a low pressure chamber. After the data collection system has proven itself in the laboratory it will be tested in 5 jumps at altitudes from 5.0k ft to 35k ft and air speeds from 90 to 250 kts. Phase II will be a series of 10 low altitude, low airspeed tests. Phase III will be a series of 10 high altitude, high airspeed tests using supplemental oxygen.

Supporting agency address information: Bureau of Medicine & Surgery 7113 Washington, D.C. 20372

SUPPORTED BY U.S. Dept. of Defense - Navy

6.0003, CYCLOTRON APPLICATIONS - REACTOR MATERIALS TECHNOLOGY (ABBREV)
R.O. BONDELID, U.S. Navy, Research Laboratory, *Washington, District of Columbia* 20390

Objectives of this research are: to determine methods of overcoming radiation damage effects in nuclear power reactors, to exploit positive ion beam techniques for trace element assays, to develop methods of producing millicurie amounts of radioisotopes, to determine systems response to simulated space radiation fields, and to study effects of intense neutron exposures to biological organisms. This research will lead to improved nuclear power sources, optimized space instruments, new medical techniques,and improved methods of oceanographic, environmental and metallurgical investigations.

Radiation effects in breeder or fusion reactor materials are simulated by implanting high energy He4 ions. Positive ion induced characteristic x-rays and ion scattering are used for elemental trace analysis and determining surface distribution of impurities. Variable ion types and energies are used to optimize reaction cross sections for producing radionuclides and or detailing space radiation responses in electronic systems. Deuterons on beryllium targets are used to produce intense neutron fields for biological exposure and radiotherapy exposures.

Supporting agency address information: Naval Research Laboratory (6000) Washington, D.C. 20375

SUPPORTED BY U.S. Dept. of Defense - Navy

6.0004, DESIGN OF IMPACT FACILITY SLED PROPULSION UNIT AND DECELERATOR
N.J. LACOSTA, A A I Corporation, *Baltimore, Maryland* 21204 (F33615-74-C-5139)

The objective of this program is to develop the facility plans, goals and specification for the extension to the AMRL impact test facility. The test system designed as a result of this work is to be used to conduct research to determine human impact exposure limits and to investigate principles and techniques of impact protection.

This effort will provide the facility development work on the extension of the AMRL impact test facility. The work includes the design of three impact facility components, the description of the performance characteristics of the components, and the preparation of engineering drawings and specifications for the components. The designs are to be accomplished in a manner to assure the successful integration of these components into the existing AMRL impulse accelerator facility. Furthermore, the design shall assure the safety of both human test subjects and operators as well as minimize operating and maintenance tasks associated with the use of the facility.

Supporting agency address information: 6570 Aerospace Medical Research Lab BB, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0005, PARAFOVEAL DETECTION OF MOTION
W.J. KENNEALLY, U.S. Army, Avionics Laboratory, *Red Bank, New Jersey* 07703

The objective of this task is to obtain empirical data on human pursuit velocity tracking behavior for both known and surprise moving 'targets' that are initially located in non-central vision. This information will be utilized in the formulation of an improved pilot eye-scanning model that will provide a capability for analysis of advanced avionic displays.

Empirical measurements of evoked eye-motion for varying levels of stimulus motion will be made using an existing remote oculometer. This equipment provides the capability to measure the direction of eye scan by means of retroreflective optics. Data will be obtained from a number of subjects to ensure that a derived model is statistically valid. Note re 74 funds- 18K labor, 32K computer.

Supporting agency address information: ECOM Army Avionics Laboratory AMSEL-VL, Fort Monmouth, N.J. 07703

SUPPORTED BY U.S. Dept. of Defense - Army

6.0006, RESEARCH ON HUMAN SKIN LASER DAMAGE THRESHOLDS FOR AIR FORCE SAFETY CRITERIA
L. GOLDMAN, Univ. of Cincinnati, School of Medicine, *Cincinnati, Ohio* 45221 (F41609-72-C-0007)

This study will determine the laser power or energy density dose levels at which minimal visible erythematic reactions are produced on human skin. The data derived from this study will enable the determination of skin safety criteria for the air force.

Laser exposures will be made on the flexor surface of the forearm on 24 human subjects. The 24 subjects will be subdivided into 4 subjects for each of 6 lasers, of which 2 subjects will be caucasian and 2 negro. For each 2 subjects, reflectometry screening will be performed so as to provide data from a closely matched pigmentation pair. The data derived from each matched pair (at least 20 exposures) will be plotted as 'erythema' or 'no erythema' as a function of power or energy density and a probability curve generated. The lasers to be used in this study will be the normal pulse ruby (694.3 nm.), having a pulse width of 2.5 milliseconds, q-switched ruby, having a pulse width of 20 nanoseconds, q-switched neodymium (1060 nm), and neodymium YAG width of 50 nsec., argon (488-514.5 nm.). All skin impacts with the continuous wave lasers, (argon, carbon dioxide and neo- dymium YAG) will be made using a constant exposure time of 1.0 seconds. All human volunteer will have detailed examinations on the lased skin areas using special testing techniques to determine the endpoint of minimal visible erythematic dose. Any degree of erythema production present at one hour, but not present after 24 hours, will be considered as a positive 'visible reaction' and the criterion damage end point.

Supporting agency address information: USAF School of Aerospace Medicine RA Brooks AFB, Texas 78235

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0007, WHOLE-BODY EFFECTS OF AIR FORCE NOISE ON PEOPLE
C.S. HARRIS, U.S. Air Force, Aerospace Med. Res. Lab., *Dayton, Ohio* 45433

A wide range of intense Air Force noise environments not only effect hearing but may interfere with motor performance, physiological functioning, thought processes and contribute to fatigue in personnel. This effort investigates types of noises and exposure conditions in which accomplishment of the Air Force mission may be threatened because of these adverse whole-body effects. Results are used to formulate exposure limitations and establish specifications for use by Air Force activities responsible for assuring that personal noise exposures are non-hazardous.

The approach is to measure effects of the many kinds of noises (infrasound, audio frequencies, impulses) on a battery of standard performance tasks on circulation in the peripheral members (fingers) and other physiological processes and on mental tasks such as memory. Findings are used to establish exposure limits beyond which undesirable effects may occur. Much of this work is possible only because of the unique laboratory sound generators available at AMRL.

Supporting agency address information: 6570 Aerospace Medical Research Lab BB, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0008, EFFECT ON BODY FUNCTION OF VIBRATION ENVIRONMENTS OF AIR FORCE OPERATIONS
D.V. STURGES, U.S. Air Force, Aerospace Med. Res. Lab., *Dayton, Ohio* 45433

The objective of this effort is to determine physiological responses to flight-type vibration forces. Responses of crew and passengers to vibrations encountered in such Air Force operations as prolonged low-altitude, high-speed flight, defensive maneuvers, and terrain avoidance are required to understand performance decrements and protection requirements. Results are used to develop (1) models for predicting injury or performance decrement, and (2) criteria for attenuation/isolation.

Human and animal subjects are exposed to vibrating or oscillating force environments using a shakeable, motion simulator, or dynamic pressure chamber. Physiological parameters such as blood flow, temperature, or nerve conduction velocity are measured. X-rays and biochemical assays are taken. Correlation is made or attempted with biodynamic parameters such as transmissibility and mechanical impedance in conjunction with project 7231-01-02. Responses are modeled and mechanisms identified which must be overcome to effect protection, or assisted to enhance performance.

Supporting agency address information: 6570 Aerospace Medical Research Lab BB. Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0009, EFFECTS OF AIR FORCE TRANSMITTER RADIATION FIELDS ON BRAIN FUNCTION
B.D. POLIS, U.S. Navy, Air Development Center, *Warminster, Pennsylvania* 18974

Determine effects of RF radiation from Air Force electromagnetic transmitters on mammalian brain functions. Data will be used to establish human exposure criteria, safety standards (AFM 161-7) and hazardous exclusion areas. It directly supports safety criteria for 4141 OTH radar. High turnover systems most likely to be affected will be studied. Companion efforts in-house and at the Southwest Texas Medical School are investigating other neurotransmitters and brain energy metabolism. Dr. Polis, Biochemistry Lab, NADC, Johnsville Pa., uniquely defined the phosphatides of blood as stress indicators, has shown there is a carotid/sagital sinus a/v difference and that this difference is related to emotional states.

Dogs are to be sacrificed with Nembutal anesthesia (30mg/kg) and their brains removed, separated into mid-brain and anterior portions of cerebellum and medulla. Part of the tissues are utilized in-house to determine prostaglandin contents in another effort. Other parts are mailed to Dr. Polis.

Supporting agency address information: USAF School of Aerospace Medicine RA Brooks AFB, Texas 78235

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0010, BIOMEDICAL EVALUATION AND CRITERIA FOR OXYGEN SYSTEMS
F.W. BAUMGARDNER, U.S. Air Force, School of Aerospace Med., *San Antonio, Texas* 78235

Physiologic criteria for aircraft oxygen system design have not been systematically evaluated for over 20 years. The purpose of this effort is to evaluate current design standards based on today's technology and the aircraft in, or forecasted for, the inventory. The specific objectives are to evaluate current oxygen systems for biomedical adequacy, explore techniques for achieving oxygen economy, and to provide physiologic evaluations of systems for the purpose of man-rating new oxygen systems. This effort supports AFFDL RN-71-1, ASD/SMl letter, dated 27 September 1971, SAMSO TN-3-71-06 and the AABNCP.

A test apparatus for both the static and dynamic testing of oxygen system components for operation and impact on the user is being developed under work unit 7164-17-09. The test stand will be available for use in the second or third quarter of FY 74. The feasibility of developing a phased dilution oxygen regulator/system is being examined using end tidal gas analysis techniques. A program and technique for man-rating systems for physiologic adequacy is being refined.

Supporting agency address information: USAF School of Aerospace Medicine VN Brooks AFB, Texas 78235

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0011, IMPROVEMENT OF FOOD ACCEPTANCE AND NUTRITIONAL QUALITIES OF AEROSPACE FEEDING SYSTEMS
J.C. CRIGLER, U.S. Air Force, School of Aerospace Med., *San Antonio, Texas* 78235

Foods intended for unique AF missions such as frozen foil pack meal components for remote site feeding, modular storage for bare base deployment, crew feeding aboard bomber and refueling aircraft, foods for full pressure suit feeding and special meals for aeromedical evacuation must meet particular requirements for quality and systems compatability. The objective is to study the USAF weapon systems to establish essential requirements for feeding system needs; establish criteria necessary for selection and development of foods and associated equipment which will satisfy requirements; and to test and evaluate foods and equipment proposed for Air Force feeding systems.

Review the USAF weapons and mission systems requirements to determine what foods, what advance food preparation and what food packaging are needed to supply appetizing and nutritious meals within the limits of the time, food preparation facilities, and general surroundings imposed by the mission. Identify specific USAF missions requiring new food products, packaging, and/or technology. Develop methods to assess the storage life of various products to assure the absence of outright food spoilage, and to detect subtle changes that would result in off flavors or unappetizing appearance, with consequent rejection of the food by the crewmen. Develop special foods and required hardware to make it possible to consume solid and liquid foods while wearing a full pressure suit.

Supporting agency address information: USAF School of Aerospace Medicine VN Brooks AFB, Texas 78235

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0012, DEVELOPMENT OF METABOLIC MEASUREMENTS APPLICABLE TO FLYING PERSONNEL
T.Q. DAVIS, U.S. Air Force, School of Aerospace Med., *San Antonio, Texas* 78235

In evaluating the significance of metabolic and related disorders in flying personnel, new measurement technics applicable in the flight environment and/or proving greater specificity of meaning are required. This effort will lead to improvement in medical standards for selection and retention of flyers, and to methods which can better characterize the nature of flight environmental stresses on metabolic and related functions.

Biochemical and radioisotopic methods will be developed and evaluated, and ranges of values in various age groups of normal flyers established. Areas of special importance include trace metal metabolism, carbohydrate metabolism (measurement of serum insulin, growth hormone, glucagon and adrenal hormones), of body fluid metabolism, red blood cell production and destruction and effects of stress (exercise) on blood coagulation.

Supporting agency address information: USAF School of Aerospace Medicine NG Brooks AFB, Texas 78235

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0013, CORNEAL AND LENTICULAR SAFETY CRITERIA FOR AF DEVELOPMENTAL AND OPERATIONAL LASERS
I.L. DUNSKY, U.S. Air Force, School of Aerospace Med., *San Antonio, Texas* 78235

To determine corneal and lenticular safety criteria for AF developmental and operational lasers. Careful studies are planned in the areas of absorption coefficients, temperature measurements, modeling and threshold determinations in order to provide accurate information concerning permissible corneal and lenticular laser exposures. The study will cover wavelength ranges in the UV and IR. This work unit will be a compilation of empirical and theoretical data leading to predictive models.

Data will be obtained through both empirical and theoretical studies using the rhesus monkey eye. Empirical studies will be concerned with areas such as the effects of repetitive UV pulsed lasers, lenticular UV damage, CO_2 pulse effects and damage of ocular absorption coefficients and corneal/lenticular temperature measurements during and after laser exposure. A determination of the criteria for ocular damage on a molecular-cellular level is planned for the UV radiation and the results of the theoretical studies and the empirical results will be incorporated into a corneal-lenticular model for the prediction of ocular damage.

Supporting agency address information: USAF School of Aerospace Medicine RA Brooks AFB, Texas 78235

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0014, EFFECTS OF ENVIRONMENTAL STRESSES ON CARDIOVASCULAR FUNCTION
H.H. ERICKSON, U.S. Air Force, School of Aerospace Med., *San Antonio, Texas* 78235

Air Force personnel may encounter a wide variety of environmental extremes in the performance of their role as an integral part of a tactical or strategic weapon system and are expected to function effectively under all conditions. Data are not available to evaluate man's response and tolerance to all of the possible single and multiple stresses that he may encounter. This effort is designed to determine man's cardiovascular response to such combined stresses as hypoxia, hypercapnia, increased workloads, fatigue, acceleration, and the interaction of these stresses, particularly as they impact on acceleration tolerance. This will permit a better understanding of the mechanisms responsible for man's performance and response during stress and will enable the Air Force to develop better protective countermeasures. This effort is responsive to NASA Ames ESP 921E-0000- 010, and in-house Work Unit 7930-03-25.

Experimental animals, including subhuman primates, will be used as models to evaluate the effects of these stressors on the cardiovascular system. The animals will be chronically instrumented with blood pressure and flow transducers in order to study cardiac function and the coronary and cerebral circulation. New techniques of data acquisition and on-line computer analysis will be used to quantitate the effects of stress and combined stress on the heart and cardiovascular system. Mathematical modeling and systems analysis will be used to predict the response to stress which man encounters in advanced aircraft systems.

Supporting agency address information: USAF School of Aerospace Medicine VN Brooks AFB, Texas 78235

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0015, CARDIOPULMONARY ASPECTS OF PHYSICAL EXERCISE IN FLYING PERSONNEL
V.F. FROELICHER, U.S. Air Force, School of Aerospace Med., *San Antonio, Texas* 78235

The leading medical cause for removal of aircrewmen from flying status is disease involving the circulatory system. This effort is to determine the value of physical exercise in the early detec-

tion of cardiopulmonary disease, in quantifying the significance of such disease to the flyer, and the value of physical fitness programs in preventing or modifying the effects of such disease. The value of physical fitness in enhancing the effectiveness of the normal aircrewman will be assessed.

Flying personnel are studied during maximum exertion to provide better understanding of normal/abnormal physiology, and follow-up is made to help establish the influence of physical condition on the course of circulatory disease. Evaluation of exercise testing procedures, types of exercise programs, monitoring methods, and development of better methods of measuring work performance will continue. The value of anerobic work measurements (e.g., blood lactate pyruvate levels, and oxygen debt) will be under study. A computer program for exercise ECG analysis has been developed and results will be correlated with other aspects of disease for diagnosis. Various approaches to the problem of studying cardiac metabolism under stress will be investigated in an attempt to develop more applicable clinical tests for heart disease.

Supporting agency address information: USAF School of Aerospace Medicine NG Brooks AFB, Texas 78235

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0016, DEVELOPMENT OF TECHNIQUES TO MEASURE CIRCULATORY AND RESPIRATORY FUNCTION IN FLYING PERSONNEL

V.F. FROELICHER, U.S. Air Force, School of Aerospace Med., *San Antonio, Texas* 78235

In support of programs to minimize the cost of diseases of the circulation and respiration to the USAF flying population, it is necessary that more sensitive physiological measurement techniques be developed and applied. This effort will accomplish this,and will establish normal value ranges specific for the flying population.

Cardiopulmonary measurements will be obtained for different age groups of normal aircrewmen, including vectorcardiography (VCG), electrocardiography (ECG), phonocardiography (PCG), and apexcardiography (APCG), exercise and dynamic stress testing, pulmonary function testing, measurement of cardiac output and coronary blood flow, and mass spectrometer studies. Computer analysis of exercise ECG's and APCG's and studies in myocardial metabolism are being added to the long-range study. Anticipated is development of a computer model of the VCG, and further VCG and ventricular conduction studies.

Supporting agency address information: USAF School of Aerospace Medicine NG Brooks AFB, Texas 78235

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0017, SIGNIFICANCE OF DISEASES OF THE EAR, NOSE AND THROAT IN FLYING PERSONNEL

H.H. HANNA, U.S. Air Force, School of Aerospace Med., *San Antonio, Texas* 78235

Certain facets of the flight environment (barometric pressure changes, oxygen breathing, etc.) make normal function of the ENT organs especially critical to the flyer. This effort is to determine the incidence and significance to the flyer of ENT disease, especially those that may compromise flying safety and/or mission effectiveness, and to establish criteria and methods to permit retention of affected crewmen on flying status.

Incidence and significance of disease of the ENT system (especially the paranasal sinuses) will be determined by clinical evaluation and x- ray studies (Water's view) of patients referred to the Aeromedical Consultation Service. Followup of all lesions demonstrated will be obtained. Of special interest will be the natural history of retention cysts of the sinuses in flyers. Carefully selected patients with a single episode of vertigo will be included in a research followup project with waiver for retention on flying status, hopefully leading to criteria for retention of a substantial number of flyers who would be grounded by current standards.

Supporting agency address information: USAF School of Aerospace Medicine NG Brooks AFB, Texas 78235

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0018, PROSPECTIVE STUDY OF SELECTED MEDICAL CONDITIONS IN FLYING PERSONNEL (CLINICAL STUDY GROUPS)

R.M. PAULL, U.S. Air Force, School of Aerospace Med., *San Antonio, Texas* 78235

To provide longitudinal surveillance of selected medical conditions of particular concern in clinical aerospace medicine, as a means of- (a) extending the flying career of rated personnel with medical defects, (b) assuring that principles of flying safety and ability to complete the mission are not compromised, and (c) refining or revalidating the physical standards or medical waiver policies for flying duties, for future reference.

Candidates for study groups are designated from the population referred to USAFSAM in accordance with AFR 161-23. Aeromedical evaluations in this group are continuously monitored by the principal investigator. Upon completion of the evaluation, the investigator determines those who should be entered in the study group(s) in accordance with established practice and precedent. The investigator arranges for distinctive labeling of the individual's health records, maintenance of a current roster of subjects and liaison with waiver authorities regarding continuation of flying duties. Conditions to be studied include aortic insufficiency, right bundle branch block, left bundle branch block, history of supraventricular arrhythmia, history of vertigo, history of gastrointestinal bleeding, abnormal electrocardiographic findings, abnormal electro-encephalographic findings, glaucoma, and hypertension requiring drug therapy.

Supporting agency address information: USAF School of Aerospace Medicine NG Brooks AFB, Texas 78235

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0019, VISUAL SYSTEM DISEASES IN AIRCREWMEN

T.J. TREDICI, U.S. Air Force, School of Aerospace Med., *San Antonio, Texas* 78235

To determine incidence and significance of diseases of the visual system in flying personnel from the standpoint of retention without compromising flying safety. Develop the means to prevent or correct such disorders. Develop technics for early diagnosis or prediction of development of such disorders.

Flying personnel with ophthalmologic problems receive a comprehensive aeromedical evaluation and a battery of function testing, including manifest and cycloplegic refractions, motility tests, tonometry, tonography, funduscopy and fundus photography. Response to aerospace environmental factors (e.g., acceleration, altitude and electromagnetic radiation) is studied in special cases. Longitudinal basic studies will assess the significance of disease in relationship to flying operations and the validity of current aeromedical standards. Fluorescein fundus photography, electro-retinography, electro- oculography, static perimetry, and biomicroscopy will be utilized in studying the effect of disease and stress on aircrewmen.

Supporting agency address information: USAF School of Aerospace Medicine NG Brooks AFB, Texas 78235

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0020, CAUSE AND SIGNIFICANCE OF FAINTING IN FLYING PERSONNEL

J.H. TRIEBWASSER, U.S. Air Force, School of Aerospace Med., *San Antonio, Texas* 78235

One of the most frequent problems related to the function of the circulatory system in flying personnel is loss of consciousness, each episode of which must by Air Force regulation be evaluated at the Aeromedical Consultation Service for recommendation concerning continuance of flying. This effort is to determine the incidence, causes and circulatory mechanisms involved with fainting in aircrewmen to enable definitive identification of cases producing risk to flying safety, and of cases whose flying careers can be salvaged.

Flying personnel of different age groups with and without syncopal episodes are studied for orthostatic tolerance (tilt table, lower body negative pressure), exercise tolerance (treadmill, ergometer and double masters test), and g tolerance. Comparison between control group and syncope group will be made. Research volunteers will be studied before and after deconditioning. Cardiovascular dynamics (cardiac output, blood pressure, blood

flow, adrenergic response, etc.) will be studied during orthostatic stress for data on mechanisms. Longitudinal follow-up of syncope cases will be used to ascertain the validity of current standards.

Supporting agency address information: USAF School of Aerospace Medicine NG Brooks AFB, Texas 78235

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0021, THE INTERRELATIONSHIP OF USAF OPERATIONAL ENVIRONMENTS AND NUTRITIONAL REQUIREMENTS

J.E. VANDERVEEN, U.S. Air Force, School of Aerospace Med., *San Antonio, Texas* 78235

A need exists for defining the changes in nutrient requirements of man which occur in altered environments which are associated with Air Force operations. This effort is designed to detect changes in energy, protein, mineral, vitamin and water requirements induced by such environmental changes as low or high oxygen partial pressure, vibration, radiation, weightlessness, emotional stress and others. It will include investigation of the nutritional impact of Air Force programs designed to reduce body weight and increase physical fitness.

Investigations of nutrient requirements will be conducted in conjunction with other research in which subjects will be held in simulated mission environments or actual operation test. Energy requirements will be calculated by maintaining a constant level of intake and measuring changes in body compositions. Requirements for protein, minerals and water will be accomplished by metabolic balance techniques. Assessment of vitamin requirements will be based on blood levels and urinary excretion rates. The impact of short-term restriction of food and water will be measured by physical performance and mental acuity changes.

Supporting agency address information: USAF School of Aerospace Medicine VN Brooks AFB, Texas 78235

SUPPORTED BY U.S. Dept. of Defense - Air Force

MATHEMATICAL AND COMPUTER SCIENCES

Includes Mathematical and Computer Sciences (general); Computer Operations and Hardware; Computer Programming and Software; Computer Systems; Cybernetics; Numerical Analysis; Statistics and Probability; Systems Analysis; and Theoretical Mathematics.

7.0001, SURVEILLANCE - COMPUTER SOLUTION OF INTEGRAL EQUATIONS

R. HANSON, Washington State University, School of Science, *Pullman, Washington* 99163 (N00014-68-A-0410-0004)

This effort will be devoted to developing methods for the computer solution of integral equations, with particular emphasis on so called equations of the first kind and equations in several dimensions. It is necessary to numerically solve integral equations of the first kind in a variety of remote sensing applications which are utilized to answer Navy surveillance needs. These remote sensing techniques include: recovery of temperature profiles in the atmosphere from reports of satellite-borne infrared detectors, measurement of variation in the geomagnetic field using magnetometers, radiometric measurement of sea surface and sea-air interface temperature distribution, and the location of objects using radar and sonar. It is also necessary to solve integral equations, often of the first kind, in order to solve problems involved in the design of Navy vehicles and weaponry. Among these problems are acoustic radiation (interaction of the transducer and a sound field), potential flow and boundary flow calculations (hydrodynamics, low speed aerodynamics and fluid machinery), and radiative heat transfer.

One of the principal thrusts of this research will be to develop techniques to overcome the inherent ill-posedness of integral equations of the first kind. Various smoothing techniques and techniques for ill- conditioned systems of linear equations will be investigated. The numerical solution of integral equations in several dimensions leads to difficulties which do not occur in one dimension. For example, large systems of linear equations are encountered and the selection of quadrature rules is much more difficult than in one dimension. The investigator will try to exploit the special structure of these large linear systems in order to facilitate their solution and will look into the efficacy of various multidimension quadrature schemes.

Supporting agency address information: Office of Naval Research 432, Arlington, Va. 22217

SUPPORTED BY U.S. Dept. of Defense - Navy

PHYSICS

Includes Physics (general); Acoustics; Atomic and Molecular Physics; Nuclear and High-energy Physics; Optics; Plasma Physics; Solid-state Physics; Thermodynamics and Statistical Physics. For Related Information See Also Engineering.

8.0001, THE ELECTRICAL AND METALLURGICAL PROPERTIES OF DEFECTS IN COMPOUND SEMICONDUCTORS 2895-E

G.L. PEARSON, Stanford University, School of Engineering, *Palo Alto, California* 94305 (DAHC04-69-C-0011)

To better understand defects in binary and ternary compounds. relevance-the successful operation of semiconductor devices consisting of binary or ternary compounds in army electronics gear such as radar, communication or optoelectronics depends largely on the fullest understnading of the crystalline defects of materials to be studied in this project.

Research will be directed toward the following areas in semiconductor systems- junction electroluminescence in gap and gaasp crystals doped with sulfur (donor) and zinc (acceptor)-fundamental studies of electrical and optical properties of the gallium aluminum arsenic system- radiation damage in gunn diodes-and operation of solid state devices in high temperature environments.

Supporting agency address information: AMC Army Research Office, Durham, Durham, N.C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

8.0002, FORCE FREE MAGNETIC FIELDS

P. STURROCK, Stanford University, School of Humanities, *Palo Alto, California* 94305 (F19628-74-C-0054)

AF function - communications, surveillance, detection, tracking. Deficiency - inadequate solar disturbance predictions. Objective - to study force free magnetic field configurations and their role in solar activity. How research contributes - development of accurate techniques for predicting these disturbances. The two magnetic field configurations associated with solar active regions are force free and open field. Over most of the volume the field is in the force free state. In addition there are localized regions or field-reversal which comprise current sheets. The early evolution of active regions leads to the development of force free magnetic field configurations. If stressed, the field becomes unstable and erupts into the open field configuration containing a current sheet. The development of the current sheet then sets the stage for the occurrence of a solar flare. The purpose of this contract is to study these field configurations in an effort to predict these magnetic field patterns that are flare connected.

Supporting agency address information: AF Cambridge Research Laboratories LM L.G. Hanscom Field, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

8.0003, REACTIONS AND ENERGY TRANSFER BETWEEN ATOMIC AND DIATOMIC SPECIES COMPOSED OF H, C, N, AND O - 8440-C

R.A. YOUNG, York University, *Toronto, Ontario, Canada* (DA-ARO(D)-31-124-73-G32)

To investigate reactions and energy transfer between atomic and diatomic species composed of H, C, N, and O. This research will contribute to the progress by the Army and the Department of Defense in such areas as re-entry phenomena, missile programs, and atmospheric communications.

Reactions between the atomic and diatomic species constitute a closed system capable of elucidating the most elementary (and thus theoretically important) reaction involving two and three atom reaction complexes. These complexes can be formed through several experimentally accessible channels, each with a

characteristic energy. Detailed calculations using presently known atomic and molecular parameters and the performance of existing experimental apparatus shows that precise and detailed experiments to measure the rate coefficients and products of the reactions between the species just enumerated are feasible. Such experiments are now in progress utilizing pulsed photolysis of simple compounds superimposed on a flowing afterglow. Extensions to multiple, pulsed-photolysis, in a wall-less, sheathed flow reactor are possible.

Supporting agency address information: OCRD Research Office Durham, Durham, N.C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

8.0004, PLASMA PHYSICS & TURBULENCE
J. WEINSTOCK, U.S. Dept. of Commerce, Environ. Research Laboratories, *Boulder, Colorado* 80302 (8DJ40822)

Project objective: Conduct theoretical research on plasma processes and turbulence which occur in the earth's atmosphere and beyond. Such processes include plasma turbulence, wave propagation, mass charge energy transport, eddy diffusion and pollution dispersal.

Current year plan: Theoretical studies of atmospheric turbulence and the relationship to transport properties. Study of ionospheric modifications by plasma parametric instability, including a prediction of the heating and airglow of such modifications. Investigations of various ionospheric irregularities in equatorial E layer, equatorial F layer and auroral E layer. Solution of Navier Stokes for fluid turbulence in the atmospheric boundary layer.

Progress report: (1) Calculation made of geomagnetic field-aligned irregularities observed during ionospheric modifications. (2) Numerical solution of nonlinear wave equation for long wave spectrum of equatorial type II irregularities. (3) Theoretical prediction of two-stream instability of several meter wavelength and 5% electron density fluctuation in quiet auroral E layer. (4) Prediction of laser heating by two forms of turbulence for controlled thermofusion sources of energy. (5) Theory developed for the break of large scale electrostatic turbulence into short scale turbulence. Important for electron acceleration in space.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

8.0005, ENERGY CONVERSION - MAGNETOHYDRODYNAMIC PLASMA FLOWS FOR POWER GENERATION FOR NAVY POWER SOURCES
H.E. WILHELM, Colorado State University, School of Engineering, *Fort Collins, Colorado* 80521 (N00014-67-A-0299-0008)

Magnetohydrodynamic power generation offers a promising solution to Navy power needs for future naval ships and fixed installations. This research is studying the theoretical aspects of the fluid dynamics of the working fluid in nonequilibrium magnetohydrodynamic power generation. The results of this effort are being utilized in the evaluation and guidance of related experimental results from the Navy program.

The contractor will use experimental results from the Navy research program on MHD to determine optimum operating parameters for MHD generators having high interaction parameters. Specifically, boundary layer separation phenomena in supersonic compressible MHD flows will be investigated in order to permit the design of MHD ducts for high power extraction (more electrical power conversion per unit length). This analysis will include the use of diatomic working gases having the possibility of population inversion directly in the MHD duct.

Supporting agency address information: Office of Naval Research 473, Arlington, Va. 22217

SUPPORTED BY U.S. Dept. of Defense - Navy

8.0006, NAVY VEHICLE DESIGN AND CONSTRUCTION - EFFECTS OF TIME AND TEMPERATURE DEPENDENT LOADINGS ON NAVAL STRUCTURES
B.A. BOLEY, Northwestern University, School of Technology, *Evanston, Illinois* 60201 (N00014-67-A-0356-0029)

The objective is the development of methods for prediction of stress and deformations in naval structures where thermal loading is important. Such structures include rocket engine components, ablating heat shields, radar and satellite antennas, and nuclear reactor components.

Current research deals with (a) the establishment of design criteria for nuclear reactor components, particularly as regards the possibility of meltdown; (b) the development of approximate methods of thermal stress analysis of rods, plates, cylinders, and spheres: (c) the construction of practical numerical and (d) the analysis of melting and ablation problems with temperature-dependent properties.

Supporting agency address information: Office of Naval Research 474, Arlington, Va. 22217

SUPPORTED BY U.S. Dept. of Defense - Navy

8.0007, MULTI-BURST MHD GENERATOR FOR AIRCRAFT HIGH POWER
O. SONJU, Avco Corporation, *Everett, Massachusetts* 02149 (F33615-71-C-1456)

The objective of this effort is to obtain criteria for three aspects of MHD channel design (a) interelectrode axial breakdown (EX) criteria as a function of electrical fields, gas composition and geometry; (b) high Hall parameter; (3) behavior and diagonal generator design, including end losses; (c) high enthalpy (high efficiency) extraction. This program investigates effects of low pressure, supersonic flow, various channel configurations, medium magnetic fields and gas composition to increase performance at reduced system weights. Repetitive bursts of power at greater than one (1) megawatt should be demonstrated.

Test at highest field strength that can be stably maintained. Things to be demonstrated will be 50 bursts of 8 seconds each. The generator will be tested by firing into a laser simulating load. Transient performance in the first second after fire command will be determined.

Supporting agency address information: AF Aero-Propulsion Laboratory POP, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

8.0008, SOLID FUEL DRIVEN MAGNETOHYDRODYNAMICS GENERATOR FOR SHORT BURST AIRCRAFT HIGH POWER
C. BANGERTER, Hercules Incorporated, *Magna, Utah* (F33615-72-C-1394)

Analyses will be conducted comparing the different approaches to explosive driven MHD. A 200 kilojoule prototype generator will be designed. If the design is promising, a generator will be constructed and demonstrated in a follow-on program. Hercules, through discussions with ARPA, was informed of a change in requirements for high energy airborne power generators. In December 1972, the program was redirected to meet the new requirements emphasizing larger pulses (1-4 sec) at a lower power level (10-15 mw).

This program will be in three phases. Phase one will consist of theoretical and experimental analyses to compile the necessary design information. In phase two a prototype magnet will be designed, constructed and tested. In phase three the information gathered during the rest of the program will be used to design a magnet system capable of supporting a 10-20 megawatt output MHD power generator. Under the redirected program, Hercules will build and test a 5 mw, 4 sec burst prototype combustion-MHD (C-MHD) generator using solid propellants as a technology base for the design of a lightweight 10 mw, 1-4 sec generator. Also, to further and more completely verify the feasibility of explosive-MHD (X-MHD) concept, a test series will be conducted in which approximately 50 kj of electrical energy will be generated in single pulses of 50 microseconds.

Supporting agency address information: AF Aero-Propulsion Laboratory POP, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

SPACE SCIENCES

Includes Space Sciences (general); Astronomy; Astrophysics; Lunar and Planetary Exploration; Solar Physics; and Space Radiation. For Related Information See Also Geosciences.

10.0001, SYNCHROTRON OPERATIONS
G. RAKOWSKY, U.S. Dept. of Commerce, Natl. Bureau of Standards, *Washington, District of Columbia* 20234

This project provides for the operation of the NBS electron synchrotron which serves the Bureau and other agencies and universities in optical standards and calibration work, as well as basic and applied research in optical physics, spectroscopy, and other areas involving ultraviolet and gamma radiation.

The synchrotron is being converted to a high-intensity electron storage ring, to be known as SURF-2. It will provide multiple beams with output extending into the extreme ultraviolet. Operation should resume in September 1974.

Objective: The objective of this project is to provide for the operation, maintenance, and improvement of the NBS electron synchrotron, as a service to users who desire to utilize its unique capabilities.

Motivation: The synchrotron emits light in a narrow, intense, highly polarized beam, with a continuous, predictable spectrum ranging from infrared through the visible and into the extreme ultraviolet. Internal targeting of the electron beam also produces gamma rays. These properties make the synchrotron an important and powerful tool to serve the needs of basic and applied research, as well as the Bureau's standards work. Recent research programs by NBS staff and guest workers include:

Studies of optical properties of materials in the ultraviolet (UV) and extreme ultraviolet (XUV), aimed at developing mirrors and windows for UV and XUV lasers. (Optical Physics Division).

Atomic absorption spectroscopy of alkali metal vapors. (Optical Physics Div.) Development and calibration of reference diodes as transfer standards for UV and XUV. (Optical Physics Division).

Calibration of a satellite-borne gamma ray telescope. (NASA).

Calibration of spectrometers used in space missions. (NRL and AFCRL).

Future research potential lies in the areas of solid state physics, surface physics and chemistry, studies of radiation damage to biological materials, UV and XUV microscopy, etc.

Approach: The synchrotron is operated by Linac Operations Section personnel, running one shift, five days per week plus occasional overtime as requested by users. One-half day per week (Monday morning) is devoted to maintenance.

SUPPORTED BY U.S. Dept. of Commerce - N.B.S.

10.0002, SPACE RADIATION MEASUREMENT
J.A. EISELE, U.S. Navy, Research Laboratory, *Washington, District of Columbia* 20390

More precise knowledge of the space environment in which Navy satellites operate is needed in order to design satellite electronic systems to withstand the effects of energetic particles. Radiation monitoring experiments will be designed to be placed on orbiting satellites to measure particle flux and energy in the earth-space environment.

The technology of solid state detectors will be utilized in building radiation flux measurement experiments for placement in NRL satellites. Techniques for calibrating the detectors and assessing the effects of radiation damage will be developed as a requirement for accurate data analysis.

Supporting agency address information: Naval Air Systems Command (AIR 370H) Washington, D.C. 20361

SUPPORTED BY U.S. Dept. of Defense - Navy

10.0003, SOLAR ACTIVITY MODELING
E.W. PETERKIN, U.S. Navy, Research Laboratory, *Washington, District of Columbia* 20390

Develop a model of solar activity using SOLRAD satellite sensor outputs to be able to provide solar flare warnings and forecasts before operational degradation occurs to military systems employing the ionosphere or space environment.

(1) Determine solar flare processes and characteristics emission as related to solar hard, non-thermal x-rays and soft, thermal x-rays measured by SOLRAD satellites; (2) expand the investigation by introducing line spectrum x-ray and particle measurements when available from the SOLRAD high satellites; (3) develop solar emission data formats necessary to input to ionospheric disturbance and assessment models developed under other tasks and; (4) develop and improve sensors required to measure solar emission necessary to verify and extend solar activity model theories.

Supporting agency address information: Naval Air Systems Command, Space Technology Division (AIR-370C-1), Washington, D.C. 20361

SUPPORTED BY U.S. Dept. of Defense - Navy

10.0004, GROUND-BASED RADIOMETRY OF CELESTIAL BACKGROUND RADIANCE
W.M. SINTON, Univ. of Hawaii, School of Arts, *Honolulu, Hawaii* 96822 (F19628-71-C-0008)

AF function - background radiance (SAMSO TN 101-64-05 and ARPA Order 1366). Deficiency - knowledge of spectral and spatial distribution of celestial background radiance, which is a limiting factor for both downlooking and sidelooking operational systems. Research - spectroscopy and radiometry of major nonstellar sources of celestial background radiance. How research contributes - spectral and radiance information on celestial background, particularly time-variable phenomena. Contractor will utilize a unique high-altitude site to perform measurements of the absolute magnitude, spectral dependence and time- variable behavior of non-stellar sources of celestial background radiance. He will also maintain an AFCRL 24-inch telescope at his high- altitude site for use by afcrl scientists in background radiance studies.

Supporting agency address information: AF Cambridge Research Laboratories LW L.G. Hanscom Field, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

10.0005, ATMOSPHERIC DENSITY AT SATELLITE ALTITUDES
J.M. FORBES, U.S. Air Force, Cambridge Research Labs., *Bedford, Massachusetts*

AF function - accurate ephemeris for SAMSO satellites. Deficiency - inability to predict vehicle ephemeris due to inaccuracies in forecasted atmospheric densities. Research - development and testing of various models for forecasting density variations in the 100-300 km region of the atmosphere. How research contributes - improves ability to predict satellite position as a function of time. The goal is to develop models which will predict density variations to the accuracy specified by AWS forecasters at the satellite control facility, Sunnyvale, California. These models are tested by their performance in predicting satellite ephemerides in a simulated operational situation.

Supporting agency address information: AF Cambridge Research Laboratories PH L.G. Hanscom Field, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

10.0006, GEOMAGNETISM
P.F. FOUGERE, U.S. Air Force, Cambridge Research Labs., *Bedford, Massachusetts*

AF function - satellite control, tracking and cataloging. Deficiency - lack of accurate and reliable models for predicting atmospheric density at satellite altitudes. Research - statistical studies based on historical solar and related data including magnetic indices, sunspots, flares, etc. How research contributes - changes in atmospheric density are closely correlated to geomagnetic variation. Prediction of geomagnetic variation is a first step to density prediction. The objective is the determination of methods of predicting geomagnetic activity from a study of historical solar and related data. parameters describing limits and pertinent time variations of geomagnetic activity together with associated solar phenomena will be sought. These parameters will be incorporated into objective statistical forecast equations for application in real-time at the AWS solar Forecast Center. Programs for automating the processing and forecasting the geomagnetic indices will also be developed for use at the Forecast Center.

Supporting agency address information: AF Cambridge Research Laboratories PH L.G. Hanscom Field, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

10.0007, SOLAR RADIO FORECASTING STUDIES CM AND MM

P.M. KALAGHAN, U.S. Air Force, Cambridge Research Labs., *Bedford, Massachusetts*

AF function - communication and detection. Deficiency - polar communications and detection systems are degraded by solar proton events. Research - establish solar radio predictors of proton events. How research contributes - permits advance warning of the occurrence and magnitude of a solar proton event which seriously effects AF missions in space, polar cap communications, and satellite orbit positions. The effort is to establish and improve prediction criteria of the proton events using solar radio data as the indicator. Special teletype codes for worldwide data transmission, rapid processing computer programs, and near-real time data display programs will be designed to facilitate space weather prediction at the AWS Solar forecast Center at Cheyenne Mt. Centimeter and millimeter wavelength radio maps will be standardized and threshold levels determined which allow advance warning of a major flare event.

Supporting agency address information: AF Cambridge Research Laboratories PH L.G. Hanscom Field, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

10.0008, UTILIZATION OF SOLAR X-RAY

R.T. PODSIADLO, U.S. Air Force, Cambridge Research Labs., *Bedford, Massachusetts*

AF function - detection and communications. Deficiency - ionospheric dependent communications and detection systems are degraded or interrupted by the response of the ionosphere to bursts of x-rays from the sun. Research - determine if and how solar x-radiation can be used to predict environment. How research contributes - successful prediction schemes permit planning for reliable communications and avoidance of radiation hazards. Solar flares have been correlated with x-ray bursts from the sun. This work unit is designed to determine the usefulness of this fact in solar forecasting schemes and, in the long range, to develop a system to be used by the AWS Solar Forecast Center at Colorado Springs, Colorado. Included functions are the planning of the acquisition and compilation of x-ray data, and analysis of the results correlated with other solar data to determine meaningful relationships. Further, these x-ray bursts of themselves cause geophysical effects. Thus, a scheme to predict the x-ray flux is to be developed, if feasible.

Supporting agency address information: AF Cambridge Research Laboratories PH L.G. Hanscom Field, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

10.0009, ENERGETIC PARTICLES

D.F. SMART, U.S. Air Force, Cambridge Research Labs., *Bedford, Massachusetts*

AF function - communications and detection. Deficiency - inability to forecast particulate environment for USAF systems. Research - identify and measure significant solar and space parameters which determine radiation environment at the earth. How research contributes - correlate theory and observations to produce techniques for real time forecasting of solar particle events. The primary goal is to develop a semi-objective technique to forecast the solar proton flux intensity expected in near-earth space after the occurrence of a proton releasing solar flare. The solar proton flux prediction model previously developed under this task and now being used by the AWS will be compared with observations and improvements made whenever practical. Assistance is being provided to the air weather service for the utilization and subsequent analysis of real-time satellite data obtained from the VELA system.

Supporting agency address information: AF Cambridge Research Laboratories PH L.G. Hanscom Field, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

10.0010, SOLAR PARTICLE OBSERVATION

G.K. YATES, U.S. Air Force, Cambridge Research Labs., *Bedford, Massachusetts*

AF function - communications and surveillance. Deficiency - unable to accurately predict solar particle effects on atmospheric ionospheric environmental conditions. Research - data acquisition and analysis required for implementation of forecasting techniques. How research contributes - will provide solar particle data required for definition of aerospace environment. Is concerned with providing data needed to define and predict the effect of solar particle induced ionospheric changes that affect AF Systems. In addition to providing data to environmental forecasters, data will be analyzed to identify critical parameters required to improve the definition of the aerospace environment and the effects of solar radiation on it. Energetic particles accelerated at the sun propagate through the interplanetary medium, impinge on the atmosphere, and significantly affect the E.M. propagation via the ionosphere. Current knowledge and prediction techniques are insufficient to accurately predict solar particle outbursts and their effects on the aerospace environment, therefore routine systematic measurements of solar particles, rapid data processing techniques and dissemination of critical parameters to forecasting personnel is essential.

Supporting agency address information: AF Cambridge Research Laboratories PH L.G. Hanscom Field, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

10.0011, IONOSPHERIC SOLAR RADIO ANALYSIS

M.D. PAPAGIANNIS, Boston University, Graduate School, *Boston, Massachusetts* 02215 (F19628-73-C-0058)

AF function - communications, detection, and navigation. Deficiency - high and middle latitude deterioriation of navigation and radar range measurements. Research - effect of magnetic storms on ionospheric total electron content and the study of polarization variations of solar proton regions. How research contributes - models of total electron content will allow systems users to correct for this parameter in UHF radars and L band navigation systems. Radio signatures of solar proton regions are being sought in the polarization parameter. If successful, advance warning of those solar storms which deteriorate hf communications will be possible. A study of morphology of high latitude TEC will assist in forecasting total electron content and thus reduce radar and navigation system errors.

Supporting agency address information: AF Cambridge Research Laboratories LI L.G. Hanscom Field, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

10.0012, REDUCTION AND UTILIZATION OF ENERGETIC PARTICLE DATA

M.P. HAGAN, Emmanuel College, Graduate School, *Boston, Massachusetts* 02115 (F19628-71-C-0060)

Af function - missile defense and surveillance. Deficiency - inadequate knowledge exists on trapped and solar radiation effects on af defense missiles and surveillance capability. Research - charged particle flux measurements. How research contributes - magnetospheric and solar related phenomena will be investigated in order to define and predict the effects of energetic particles on conditions in the upper atmosphere and space. Experimental data obtained from balloons, rockets and satellite detectors are analyzed to explain the observed phenomena. This will include data on protons, alphas, heavies and electrons. particle detectors appropriate for these measurements are designed, developed and modified, tested and calibrated for flight on Af space probes.

Supporting agency address information: AF Cambridge Research Laboratories PH, L.G. Hanscom Field, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

10.0013, DYNAMICS OF THE SOLAR ATMOSPHERE
D.M. MENZEL, Harvard University, School of Arts, *Cambridge, Massachusetts* 02138 (F19628-72-C-0146)

AF function - communications, detection and tracking. Deficiency - solar emissions perturb the ionosphere causing detection false alarms and communications blackouts and they cause variations in density affecting satellite orbits. Research - solar magnetohydrodynamics, the physical characteristics of the solar corona, and spectral line formation in the solar chromosphere. How research contributes - sound predictions of the solar emission of x-rays and particles responsible for terrestrial and near space disturbances require much more knowledge of the physics of solar activity than we now have. The purpose of this contract is to clarify the physics of the sunspots, chromosphere, and corona, which will be an important contribution to the overall physical picture. Publication - 'Fine Structure in CaII on the Solar Disk', Jay M. Pasachoff, Solar Physics, 1970, 12, 202.

Supporting agency address information: AF Cambridge Research Laboratories LM L.G. Hanscom Field, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

10.0014, NAVY ENVIRONMENT - SPACE RADIATION HAZARDS
C.J. WADDINGTON, Univ. of Minnesota, School of Physics, *Minneapolis, Minnesota* 55455 (N00014-67-A-0113-0021)

The radiation present in the upper atmosphere results in one of the most hazardous of the Navy environments. Adequate radiation protection is required for manned and unmanned space systems and high flying aircraft. This work will provide basic information on the types, amounts, and effects of the extremely ionizing radiation to be encountered in the upper atmosphere, ionosphere, and magnetosphere.

Properties of the radiation present in the upper atmosphere will be studied. Peak intensities and variations in the levels and energies of the radiation present will be analyzed.

Supporting agency address information: Office of Naval Research 422, Arlington, Va. 22217

SUPPORTED BY U.S. Dept. of Defense - Navy

10.0015, SOLAR PATROL
J.W. EVANS, U.S. Air Force, Sacramento Peak Observatory, *Sunspot, New Mexico* 88349

AF function - communications, detection, tracking. Deficiency- inadequate precision of predictions of damaging sun induced geophysical disturbances. Objective - monitor optically observable solar activity for use in other 7649 work units. How research contributes - development of accurate techniques for predicting these disturbances. Observe the sun photographically on a routine basis in the following ways: The 10 cm aperture H alpha patrol telescope photographs the whole sun through a birefringent filter on 35mm film, in the light of the H alpha red line of hydrogen at normal intervals of 1 minute, or 10 seconds when flare activity is predicted. The system includes a video camera that displays a real time H alpha image of the sun on several TV monitors at observing locations. On the same mounting is a white light patrol which photographs the sun at 5 minute or 1 minute intervals through a broad band filter. The coronal patrol consists of one or two daily photographs of the slowly changing coronal spectrum at all position angles around the solar limb, taken with a 10 cm coronagraph and spectrograph. A 15 cm coronagraph, filter and 35 mm camera photograph the coronal structure daily clear around the solar limb, then takes time lapse movies of coronal activity as long as weather permits.

Supporting agency address information: AF Cambridge Research Laboratories LM L.G. Hanscom Field, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

10.0016, SPARK CHAMBER SPECTROMETRY AND SPACE RADIATION STUDIES
R.C. MADLEY, Kent State University, Graduate School, *Kent, Ohio* 44240 (F19628-72-C-0204)

AF function - heavy particle damage to satellite electronics. Deficiency - need improved detection techniques to efficiently monitor such particles. Research - prepare an instrument package for testing the spark chamber spectrometer. This test will be carried out on a mountain top. How research contributes - will help the Air Force maintain state- of-the-art expertise in regard to latest techniques in particle detection. It will also provide a new data on the high z particle component.

Supporting agency address information: AF Cambridge Research Laboratories PH L.G. Hanscom Field, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

10.0017, LONG TERM RADIATION EFFECTS
J.H. KRUPP, U.S. Air Force, School of Aerospace Med., *San Antonio, Texas* 78235

The effects of radiation encountered in aerospace operations must be defined and evaluated. Threshold values for radiation changes are needed to establish a technology base and necessary safety criteria for nonionizing radio frequency environments, extended crew missions, very high altitude polar flights, nuclear powered aircraft environments and space shuttle operations. Very little information exists on the long term hazards of exposure to nonionizing and particulate radiation. The information is also of prime concern to NASA.

Utilizing a unique colony of survivors of acute experiments performed in 1964 and 1965, proton and electron irradiated primates are maintained for lifetime study of late radiation effects. By means of physical examinations, hematological and biological tests and necropsy, the epidemiological impact of their prior radiation exposure is evaluated. Data produced is evaluated to assess risks from aerospace operations, refine probability estimates of harmful delayed effects, and to set realistic exposure limits for personnel on missions involving radiation exposure.

Supporting agency address information: USAF School of Aerospace Medicine RA Brooks AFB, Texas 78235

SUPPORTED BY U.S. Dept. of Defense - Air Force

10.0018, IONOSPHERE RESPONSE TO SOLAR ECLIPSE
A.N. HUNTER, Lancaster University, *Lancaster, England, United Kingdom* (AF-AFOSR-2544-73)

AF function - ionospheric research. Deficiency - insufficient knowledge of the characteristics of the equatorial ionosphere and the effects of transient disturbances on radio propagation. Research - radio transmission from a geosynchronous artificial satellite will be recorded by ground stations in East Africa during a solar eclipse on 30 june 1973. Attempts will be made to detect the passage of atmospheric gravity waves induced by the cooling of the very high atmosphere as the incoming solar radiation is cut off. How research contributes - data will provide information to allow checking the validity of some predictions concerning the effects of atmospheric gravity waves on the ionosphere.

To plan the installation and operation of four radio receivers at different locations in East Africa, to record Faraday rotation of the radio signal transmitted by the satellite INTELSAT IIF3 during a solar eclipse on 30 June 1973.

Supporting agency address information: European Office of Aerospace Research & Development NRP FPO New York 09510

SUPPORTED BY U.S. Dept. of Defense - Air Force

VOLUME 13 NUMBER 3 / FEBRUARY 8, 1975

Scientific and Technical Aerospace Reports

A Semimonthly Publication of the National Aeronautics and Space Administration

01 AERONAUTICS (GENERAL)

No abstracts in this category.

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N75-11892*# Kanner (Leo) Associates, Redwood City, Calif.
CALCULATION OF THE FLAPWISE BENDING, EDGEWISE BENDING, AND TORSIONAL VIBRATIONS OF ROTOR BLADES WITH COUPLED NATURAL MODES AND FREQUENCIES
H. Oette Washington NASA Nov. 1974 69 p refs Transl. into ENGLISH from the German report DLR-FB-71-108
(Contract NASw-2481)
(NASA-TT-F-16004; DLR-FB-71-108) Avail: NTIS HC $4.25 CSCL 01B

The natural-mode-method, presented by Guillenschmidt, was expanded from one to two degrees of freedom, and then to the three coupled degrees of flapwise bending, edgewise bending and torsion. For the coupled natural modes, which are assumed to be known, the orthogonal relations are formulated and the differential equations for the generalized degrees of freedom are derived. The theory was further extended by adding the moment of inertia due to the extension of the blade across to its axis and applying a flapping coordinate system. For the numerical examples the following items are considered: (1) the forward flight data of the S-61 helicopter; (2) coupled natural modes computed by the multihinge articulated blade method; and (3) schematized nonstationary aerodynamic coefficient curves.
Author

N75-11893*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
EFFECTS OF LEADING EDGE SWEEP ANGLE AND DESIGN LIFT COEFFICIENT ON PERFORMANCE OF A MODIFIED ARROW WING AT A DESIGN MACH NUMBER OF 2.6
Robert J. Mack Washington Dec. 1974 51 p refs
(NASA-TN-D-7753; L-9446) Avail: NTIS HC $4.25 CSCL 01B

Wing models were tested in the high-speed section of the Langley Unitary Plan wind tunnel to study the effects of the leading-edge sweep angle and the design lift coefficient on aerodynamic performance and efficiency. The models had leading-edge sweep angles of 69.44 deg, 72.65 deg, and 75.96 deg which correspond to values of the design Mach-number-sweep-angle parameter (beta cotangent A) sub DES of 0.6, 0.75, and 0.9, respectively. For each sweep angle, camber surfaces having design lift coefficients of 0.0.08, and 0.12 at a design Mach number of 2.6 were generated. The wind-tunnel tests were conducted at Mach numbers of 2.3, 2.6, and 2.96 with a stagnation temperature of 338.7 K (150 F) and a Reynolds number per meter of 9.843 times 10 to the 6th power. The results of the tests showed that only a moderate sweeping of the wing leading edge aft of the Mach line along with a small-to-moderate amount of camber and twist was needed to significantly improve the zero-lift (flat camber surface) wing performance and efficiency.
Author

N75-11894# Research Inst. of National Defence, Stockholm (Sweden).
FORTRAN PROGRAM FOR CALCULATING THE TRAJECTORY OF PROJECTILES [FORTRANPROGRAM FOER BERAEKNING AV PROJEKTILBANOR]
Nils Gylden and Ake Johnsson Dec. 1972 20 p refs In SWEDISH
(FOA-2-A-2564-D8) Avail: NTIS HC $3.25

A FORTRAN program for calculating the trajectory of projectiles with two degrees of freedom in flight is reported. Dupois description of air resistance is used in OB standard air. The program chooses its computation interval by taking into account ejection velocity and air drag, and adapts it continuously over the trajectory throughout the running time. The program costs less than 1 krona/trajectory to run, and is therefore very suitable for calculating a number of trajectories. Agreement with firing tables is very good and the calculation errors are entirely within table accuracy.
Author

N75-11895# Research Inst. of National Defence, Stockholm (Sweden).
MEASUREMENT OF SPLINTER RETARDATION BY MEANS OF DOPPLER RADAR, INTRODUCTORY POINTS OF VIEW [MAETNING AV SPLITTERRETARDATION MED DOPPLERRADAR, INLEDANDE SYNPUNKTER]
Bo Janzon Oct. 1972 13 p refs In SWEDISH
(FOA-2-C-2567-D4) Avail: NTIS HC $3.25

Some points of view are elaborated concerning the measuring and evaluation procedures in tests for the measurement of splinter retardation in air by Doppler radar during free flight. An account is presented of a trial method to ascertain its feasibility.
Author

N75-11896*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
A WIND TUNNEL INVESTIGATION OF THE WAKE NEAR THE TRAILING EDGE OF A DEFLECTED EXTERNALLY BLOWN FLAP
William G. Johnson, Jr. and Gerald E. Kardas Washington Oct. 1974 190 p refs
(NASA-TM-X-3079; L-9665) Avail: NTIS HC $7.00 CSCL 01A

The model tested was a general research model of a swept-wing, jet-powered STOL transport with externally blown flaps. The model was tested with four engine simulators mounted on pylons under the wing. Tests were conducted in the V/STOL

tunnel over an angle of attack range of 0 deg to 16 deg and a thrust coefficient range from 0 to approximately 4 at a Reynolds number of 0.461 x 1 million based on the wing reference chord. The results of this investigation are presented primarily as plots of the individual velocity vectors obtained from the wake survey. These data are used to extend an earlier analysis to isolate the effects of the engine thrust on the behavior of the flow at the flap trailing edge. Results of a comparison with a jet-flap theory are also shown. Author

N75-11897# Research Inst. of National Defence, Stockholm (Sweden).
GROUND EFFECT DEVICES FOR TRANSPORT OF PERSONNEL AND GOODS OVER SHORT DISTANCES USING AIR SUSPENSION [TRANSPORTSKAERMAR FOER PERSON-OCH GODSBEFORDRAN KORTARE STRAECKOR GENOM LUFTEN]
Stina Palme Mar. 1973 121 p refs In SWEDISH
(FOA-2-A-2566-F8(F3)) Avail: NTIS HC $5.25

Ground effect devices is a collective name for many different light weight devices of varying form which are preponderantly for non-contact flight over short distances carrying loads of different kinds. The report deals with such devices, their function and certain fundamental characteristics. Information has been obtained from unclassified literature and available matter which, after certain appraisal and arrangement, has been compared so as to give a survey of the development. Author

N75-11898*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
AERODYNAMIC ROLL DAMPING OF A T-TAIL TRANSPORT CONFIGURATION
Richard P. Boyden Washington Dec. 1974 31 p refs
(NASA-TM-X-3115; L-9378) Avail: NTIS HC $3.75 CSCL 01B

The aerodynamic roll damping and the yawing moment due to roll rate for a model of a T-tail transport with aft-mounted engines were measured by means of a small-amplitude forced-oscillation mechanism. The tests were made for Mach numbers between 0.21 and 0.80 over a range of angles of attack from about minus 4 deg to 22 deg. The basic configuration had positive damping in roll at low angles of attack with regions of low positive and negative damping for angles of attack above 8 deg to 10 deg. There was good agreement between the theoretical estimates of the roll damping for the wing alone and the experimental results at an angle of attack of 0 deg for Mach numbers of 0.60 and less. The T-tail configuration and the engine nacelles mounted aft on the fuselage did not significantly affect either the damping in roll or the yawing moment due to roll rate. Author

N75-11899# Commissariat a l'Energie Atomique, Saclay (France).
TECHNICAL PROBLEMS ENCOUNTERED IN THE STUDY OF A DIRIGIBLE FREIGHTER
D. Costes 22 Oct. 1973 25 p In FRENCH Presented at the AERALL colloq., Paris, 12-14 Nov. 1973
(CEA-Conf-2580; Conf-731138-4) Avail: AEC Depository Libraries HC $4.25

Technical problems associated with the commercial flight of a dirigible freighter are discussed. Specific problems include construction materials, drag resistance, various systems of floatability, propulsion, maneuverability, and landing. An analysis was also made of the economic aspects of such a ship.
Transl. by E.H.W.

N75-11900# Ballistic Research Labs., Aberdeen Proving Ground, Md.
AN IMPROVED PROJECTILE BOATTAIL Final Report
Anders S. Platou Jul. 1974 36 p refs
(DA Proj. 1T1-61102-A-33D)
(AD-785520; BRL-MR-2395) Avail: NTIS CSCL 19/1

A series of projectile boattails have shown improved aerodynamic performance over the standard conical boattail. These boattails have equal or lower drag and an improved gyroscopic stability. Their Magnus and damping characteristics appear to be satisfactory so that the projectile should be dynamically stable. Also, these boattails increase the projectile wheel base considerably, thereby decreasing the balloting in the gun tube. The improved aerodynamic performance could lead to longer ranges, longer projectiles or lower spin rates for future projectiles. Author (GRA)

N75-11901# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
APPLICATION OF THE NONLINEAR THEORY OF A LISTING SURFACE TO THE CALCULATION OF AERODYNAMIC CHARACTERISTICS OF A TRIANGULAR WING MOVING CLOSE TO THE EARTH'S SURFACE
S. D. Ermolenko, Yu. A. Rogozin, and G. V. Rogachev 26 Aug. 1974 22 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Sibirskoe otd., Ser. Tekhn. Nauk (USSR), no. 8, 1969 p 14-26
(AD-785154; FTD-HC-23-1802-74) Avail: NTIS CSCL 01/1

A solution of the problem under consideration for triangular wings is proposed by means of the nonlinear theory of a lifting surface, making it possible to consider nonlinear effects determined both by the influence of the wing tips and also by the proximity of the surface of the earth. GRA

N75-11902# Fabric Research Labs., Inc., Dedham, Mass.
DEVELOPMENT OF STRETCH FABRIC FOR PARACHUTE CANOPIES Final Report, 2 Jul. 1971 - 17 Apr. 1974
John Skelton and Norman J. Abbott Aug. 1974 59 p refs
(Contract F33657-71-C-1168)
(AD-785195; ASD-TR-74-26) Avail: NTIS CSCL 01/3

A new lightweight one-way stretch parachute canopy fabric was developed for use in personnel parachutes, whose mechanical properties are equal to the conventional 1.1 oz/sq yd canopy fabric, but which shows a greatly increased air permeability under the loading conditions experienced during deployment. The variation of permeability with pressure differential for a range of biaxial loading conditions was investigated for the new fabric and for other canopy fabrics, and it was shown that for maximum effectiveness the easy stretch direction of the new fabric should be oriented parallel to the direction of maximum stress in the parachute canopy. Author (GRA)

N75-11903# Kaman Aerospace Corp., Bloomfield, Conn.
ANALYSIS OF UNMANNED, TETHERED, ROTARY-WIND PLATFORMS Final Technical Report, Aug. 1973 - Apr. 1974
Lawrence H. McNeill, Arvid Plaks, and William E. Blackburn Jul. 1974 181 p refs
(Contract DAAJ02-74-C-0008)
(AD-785581; R-1259; USAAMRDL-TR-74-56) Avail: NTIS CSCL 01/3

A study was conducted; (1) to determine the feasibility of an unmanned, tethered, rotary-wing vehicle as an elevated platform for target detection sensors or other payloads, and (2) to determine the best approach to implementing specified design and performance requirements. A review was made of current and past developments of tethered platforms, and a large number of rotary-wing lift concepts, rotor drive and long-endurance power concepts, and stabilization and control concepts were formulated for evaluation. Mathematical models were designed and a digital computer was used to generate quantitative data on air vehicle size, weight, horsepower, etc., for alternative systems. A turboshaft-driven synchropter, utilizing fuel pumped from the ground for long endurance, was recommended as the best overall approach for an unmanned tethered platform. The synchropter, with cyclic pitch controls, will provide a stable platform for mission sensors and can be operated, without attention from the ground, by a simple automatic flight control system. (Modified author abstract) GRA

N75-11904# Chrysler Corp., New Orleans, La. Data Management Services.
TRANSONIC AND SUPERSONIC WIND TUNNEL TEST OF THE ACTION HYPERVELOCITY TEST MISSILE. VOLUME 1: STABILITY CHARACTERISTICS
William D. Washington 20 Feb. 1974 407 p refs
(Contract DAAH03-74-C-0405)
(AD-785565; DMS-AR-1011-Vol-1; RD-73-23-Vol-1) Avail: NTIS CSCL 01/1

Two wind tunnel tests were conducted at AEDC and BRL to define the stability characteristics of the ACTION hypervelocity

test missile. The AEDC test investigated the transonic launch-coast phase of flight while the BRL test investigated the supersonic boost-sustain phase. The basic flight configuration was tested plus configuration which consisted of changes in the nose, canards, canard position, and flared angle. Mach numbers investigated ranged from 0.3 to 4.5 over an angle of attack range of -4 to +4 degrees at 0 degrees sideslip. The test was designated BRL 955/AEDC 289. Author (GRA)

N75-11905# Chrysler Corp., New Orleans, La. Data Management Services.
TRANSONIC AND SUPERSONIC WIND TUNNEL TEST OF THE ACTION HYPERVELOCITY TEST MISSILE. VOLUME 2: DRAG CHARACTERISTICS
William D. Washington 20 Feb. 1974 381 p
(Contract DAAH03-74-C-0405)
(AD-785566; DMS-AR-1011-Vol-2; RD-73-23-Vol-2) Avail: NTIS CSCL 01/1
For abstract, see N75-11904.

N75-11906# Army Aviation Systems Command, St. Louis, Mo.
MAJOR ITEM SPECIAL STUDY (MISS), CH-54A ROTARY WING BLADE Interim Report, 1 Jan. 1964 - 30 Jun. 1973
Aug. 1974 22 p
(AD-785554; USAAVSCOM-TR-74-39) Avail: NTIS CSCL 01/3
Major Item Special Study (MISS) reports are performed on DA Form 2410 reportable components. These are time change items and certain condition change items selected because of high cost or need for intensive management. Basically, the MISS reports are concerned with analyzing reported removal data presented in the Major Item Removal Frequency (MIRF) report. The failure modes reported for each removal are examined and grouped into categories which are intended to clarify the intent of the data reporting. From this data, removal distribution can be plotted and an MTR (mean time to removal) can be calculated. The MISS reports then investigate possible cost savings based on total elimination of selected failure modes. These modes are chosen because of the percentage of failures they represent and/or because they appear to be feasible Product Improvement Program (PIP) areas. Author (GRA)

N75-11907# Artec Associates, Inc., Hayward, Calif.
FEASIBILITY OF EXPLOSIVELY DRIVEN HYPERVELOCITY PROJECTILES Final Report, 1 Jun. 1973 - 31 Mar. 1974
D. W. Baum, S. P. Gill, and G. R. Mihalik Mar. 1974 111 p refs
(Contract DAAK02-73-C-0397)
(AD-784271; FR-109) Avail: NTIS CSCL 19/1
An experimental and analytical study was conducted in support of the HIBS program to determine the feasibility of explosively accelerating multiple gram-sized projectiles to 10 km/sec. Emphasis was directed toward developing and testing lightweight, low cost, and weaponizable devices using advanced explosive driver concepts. Problems were encountered with material properties, an unusual explosive driver startup phenomena associated with the new materials, and projectile breakup. A weaponizable device is however feasible. Best performance to date is the simultaneous launching of five 1-g steel and nylon projectiles to 7.5 km/sec in a lightweight device using Comp. C-4 explosive and argon driver gas at 59 psig initial pressure. (Modified author abstract) GRA

N75-11908# ARO, Inc., Arnold Air Force Station, Tenn.
EXPERIMENTAL MAGNUS CHARACTERISTICS OF SEVERAL BALLISTIC PROJECTILES WITH VARIOUS BOATTAIL ANGLES AND LENGTHS AT MACH NUMBERS 1.5, 2.0, AND 1.5
Leroy M. Jenke AEDC Sep. 1974 84 p refs
(AF Proj. 2547)
(AD-785346; ARO-VKF-TR-74-48; AEDC-TR-74-78) Avail: NTIS CSCL 19/1
An experimental investigation was conducted to determine the effects of boattail angle, the boattail length, and the base diameter on the Magnus-force and moment characteristics of spin-stabilized projectiles. The models were tested at Mach numbers 1.5, 2.0, and 2.5 over an angle-of-attack range from -2 to 8 deg. Data were obtained at length Reynolds numbers of 2,440,000, 9,600,000, and 17,530,000, and for spin parameter (pd/2V sub infinity) values of 0.024 to about 0.270 radians. Results are presented showing the effects of spin, Mach number, angle of attack, boattail geometry, and Reynolds number. (Modified author abstract) GRA

N75-12743* Massachusetts Inst. of Tech., Cambridge. Center for Space Research.
AN ORIENTABLE, STABILIZED BALLOON-BORNE GONDOLA FOR AROUND-THE-WORLD FLIGHTS
George R. Ricker and Walter H. G. Lewin *In* NASA. Ames Res. Center Telescope Systems for Balloon-Borne Res. Nov. 1974 p 71-80 (For availability see N75-12735 03-74)
CSCL 01C

N75-12748* Ball Bros. Research Corp., Boulder, Colo.
BALLOON PLATFORM FOR EXTENDED-LIFE ASTRONOMY RESEARCH
L. T. Ostwald *In* NASA. Ames Res. Center Telescope Systems for Balloon-Borne Res. Nov. 1974 p 136-144 (For availability see N75-12735 03-74)
CSCL 01C

N75-12752* Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
AIR FORCE CAMBRIDGE RESEARCH LABORATORIES BALLOON OPERATIONS
Thomas J. Danaher *In* NASA. Ames Res. Center Telescope Systems for Balloon-Borne Res. Nov. 1974 p 160-164 (For availability see N75-12735 03-74)
CSCL 01C

N75-12760* Marconi Space and Defence Systems Ltd., Camberley (England). Stabilized Balloon Platform Project.
A GENERAL PURPOSE STABILISED BALLOON PLATFORM
John How *In* NASA. Ames Res. Center Telescope Systems for Balloon-Borne Res. Nov. 1974 p 284-293 (For availability see N75-12735 03-74)
CSCL 01C

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation*.

N75-11909# Sydney Univ. (Australia). Dept. of Aeronautical Engineering.
THE AIRLINE MINIMUM FLEET PROBLEM
H. Q. Danh Sep. 1974 93 p refs
(Aero-TN-7403) Avail: NTIS HC $4.75
The problem of determining a schedule for a traffic system such as an airline system that requires a minimum number of vehicles is formulated as a special-type assignment problem. Two proposed solution algorithms are presented and demonstrated on the past examples, for both fixed departure times and variable ones within a given time tolerance. The conclusion is that the algorithm can be applied to solve a large scale problem with considerable efficiency and simplicity. The method is then applied to Australian Domestic Airline System for flight scheduling (1969) and fleet planning (1980). Author

N75-11910*# Douglas Aircraft Co., Inc., Long Beach, Calif.
PARAMETRIC STUDY OF STOL SHORT-HAUL ENGINE CYCLES AND OPERATIONAL TECHNIQUES TO MINIMIZE COMMUNITY NOISE IMPACT Final Report
Washington NASA Nov. 1974 89 p refs
(Contract NAS2-6994)
(NASA-CR-2486) Avail: NTIS HC $4.75 CSCL 01B
The effect of aircraft operational techniques in the terminal area on community noise impact of future short-haul aircraft was investigated. These operational techniques affected altitude,

flap retraction rate, thrust cutback altitude, amount of thrust cutback, and amount of turning. During landing the parameters varied were glide slope angle, change in slope angle (two segment approach), and flap extension rate. One mechanical-flap (MF) aircraft and one externally-blown-flap (EBF) aircraft were used to study by noise impact at four U.S. airports, Hanscom Field (Boston); Washington National; Midway (Chicago); and Orange County (California). With the exception of Washington National (DCA), the study showed that a reduction of approximately 40 percent in the number of people highly annoyed (as defined in the study) can be obtained by using these operational techniques. At DCA the number of people highly annoyed using the standard procedure was quite low, but it is significant that the minimum-impact case for Runway 36 reduced the number of people highly annoyed to zero using a power cutback and a turning departure path. The evaluation procedures and methodology developed in this study represents an advance in acoustical state-of-the-art and should provide an effective and useful tool for determining aircraft noise impact upon the airport community. Author

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *Communications*.

N75-11911*# Ohio Univ., Athens. Avionics Engineering Center.
OMEGA FLIGHT-TEST DATA REDUCTION SEQUENCE
Robert W. Lilley Nov. 1974 15 p
(Grant NGR-36-009-017)
(NASA-CR-140827; TM-12) Avail: NTIS HC $3.25 CSCL 17G

Computer programs for Omega data conversion, summary, and preparation for distribution are presented. Program logic and sample data formats are included, along with operational instructions for each program. Flight data (or data collected in flight format in the laboratory) is provided by the Ohio University Omega receiver base in the form of 6-bit binary words representing the phase of an Omega station with respect to the receiver's local clock. All eight Omega stations are measured in each 10-second Omega time frame. In addition, an event-marker bit and a time-slot D synchronizing bit are recorded. Program FDCON is used to remove data from the flight recorder tape and place it on data-processing cards for later use. Program FDSUM provides for computer plotting of selected LOP's, for single-station phase plots, and for printout of basic signal statistics for each Omega channel. Mean phase and standard deviation are printed, along with data from which a phase distribution can be plotted for each Omega station. Program DACOP simply copies the Omega data deck a controlled number of times, for distribution to users. Author

N75-11912*# Ohio Univ., Athens. Avionics Engineering Center.
LOW COST OMEGA NAVIGATION RECEIVER
Robert W. Lilley Oct. 1974 39 p refs
(Grant NGR-36-009-017)
(NASA-CR-140853; TM-9) Avail: NTIS HC $3.75 CSCL 17G

The development of a low cost Omega navigation receiver is discussed. Emphasis is placed on the completion and testing of a modular, multipurpose Omega receiver which utilizes a digital memory-aided, phase-locked loop to provide phase measurement data to a variety of applications interfaces. The functional units contained in the prototype device are described. The receiver is capable of receiving and storing phase measurements for up to eight Omega signals and computes two switch-selectable lines of position, displaying this navigation data in chart-recorded form. Author

N75-11913# Royal Aircraft Establishment, Farnborough (England).
THE TAM-TAM SYSTEM
J. Louet May 1974 30 p Transl. into ENGLISH from the French report AGARD-CP-105
(RAE-Lib-Trans-1756; BR42249; AGARD-CP-105) Avail: NTIS HC $3.75

The aim of the TAM-TAM system, is to provide an air-ground-air data transmission link which is capable of being used with all types of flight path profile (sea and continental areas and terminal control areas). The development of automation in control towers, the possibilities offered by time numerical multiplexing of information, the introduction of navigational computers and cathode-ray tube displays in the aircraft are many of the factors which have allowed us to envisage new exchange structures and procedures adapted to these unceasingly-growing requirements by the users. This study gives an analysis of the problem and the solutions advocated in order to define an experimental and simulation program called the TAM-TAM program. Author

N75-11914# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
DEPOT REQUIREMENTS FOR BASE LEVEL DATA ON AIRCRAFT INERTIAL PLATFORMS M.S. Thesis
Wilfred H. Plunkett and Richard N. Moore Aug. 1974 142 p refs
(AD-785443; SLSR-2-74B) Avail: NTIS CSCL 17/7

Some of the most expensive aircraft components to maintain are stabilized platforms used in aircraft inertial systems. In the majority of USAF aircraft equipped with an inertial system, the inertial platform ranges from the second to the eighth most expensive component to maintain. For most of these aircraft, depot level maintenance constitutes from 55 to 90% of the total inertial platform support costs. Several recent programs to improve reliability and reduce support costs of aircraft inertial systems have been hampered by the quality and type of base level performance and maintenance data available to the Aerospace Guidance and Metrology Center (AGMC), USAF's inertial platform central repair depot. This study was an attempt to determine AGMC's specific requirements for base level data. (Modified author abstract) GRA

N75-11915# Aerospace Guidance and Metrology Center, Newark Air Force Station, Ohio.
PROCEEDINGS OF QUARTERLY MEETING OF LIFE CYCLE COST TASK GROUP OF THE JOINT SERVICES DATA EXCHANGE FOR INERTIAL SYSTEMS Final Report
Thomas D. Meitzler 25 Apr. 1974 91 p Conf. held at Anaheim, Calif., 23-25 Apr. 1974
(AD-785390; AGMC-74-010II) Avail: NTIS CSCL 17/7

The proceedings describe the second quarterly meeting of the Life Cycle Cost Task Group of the Joint Services Data Exchange for Inertial Systems. The report includes an Introduction by Task Group Chairman, Russell Genet, and educational presentations on life cycle casting. Also included is a report on progress towards a standardized government/contractor life cycle cost model for inertial systems. Author (GRA)

N75-11916# Intermetrics, Inc., Cambridge, Mass.
MODIFIED POST-FLIGHT PROCESSOR FOR CIRIS Final Technical Report
Peter A. Grundy 2 Jul. 1974 77 p refs
(Contract F29601-73-C-0089; AF Proj. 688G)
(AD-785370; IR-87-74; AFSWC-TR-74-23) Avail: NTIS CSCL 17/7

The results of tests conducted to verify the CIRIS (Completely Integrated Reference Instrumentation System) Modified Post-Flight Processor (MPFP), using real flight data, are discussed. Three separate tests, exhibiting the MPFP performance using different measuremen t information, were conducted on data recorded during a flight test on March 8, 1974. The White Sands Cinetheodolite estimates of position and velocity were used as a reference against which to compare the MPFP outputs. (Modified author abstract) GRA

N75-11917# Mitre Corp., McLean, Va.
AN ADVANCED AIR TRAFFIC MANAGEMENT CONCEPT BASED ON EXTENSION OF THE UPGRADED THIRD

GENERATION ATC SYSTEM. SYSTEM B: AIRPORT CAPACITY ANALYSIS
R. R. Iyer and D. Goldman Sep. 1973 61 p refs
(Contract DOT-FA70WA-2448)
(AD-785334; MTR-6419-Ser-6; FAA-EM-73-10A-Ser-6) Avail: NTIS CSCL 17/7

The report gives the analysis of IFR runway capacity constraints for twenty nine primary high density airports. These airports were examined during the course of the Advanced Air Traffic Management System B study. The mathematical model used to determine IFR runway capacity takes into account the runway configuration, approach control delivery precision, aircraft performance characteristics, aircraft safety separation standards, runway occupancy rule, departure/arrival spacing and departure/departure spacing. The analysis shows that thirteen of the twenty nine airports will be capacity limited in 1995. GRA

N75-11918# Aerospace Guidance and Metrology Center, Newark Air Force Station, Ohio.
PROCEEDINGS OF QUARTERLY MEETING OF LIFE CYCLE COST TASK GROUP OF THE JOINT SERVICES DATA EXCHANGE FOR INERTIAL SYSTEMS Final Report
Russell M. Genet and Don E. Hunt 24 Jan. 1974 247 p Conf. held at Clearwater, Fla., 22-24 Jan. 1974
(AD-785391; AGMC-74-012II) Avail: NTIS CSCL 17/7

The proceedings describe the first meeting of the Life Cycle Cost Task Group of the Joint Services Data Exchange for Inertial Systems. The report contains copies of educational presentations on various subjects connected with Life Cycle Costing and with Maintenance Warranties. Author (GRA)

N75-11919# Mitre Corp., McLean, Va.
AN ADVANCED AIR TRAFFIC MANAGEMENT CONCEPT BASED ON EXTENSIONS OF THE UPGRADED THIRD GENERATION ATC SYSTEM Final Summary Report, Aug. 1972 - Jun. 1973
R. M. Harris, B. D. Elrod, J. J. Fee, D. Goldman, and V. P. Gupta Mar. 1974 243 p refs
(Contract DOT-FA70WA-2448)
(AD-785023; MTR-6419-Rev-1; FAA-EM-73-10A) Avail: NTIS CSCL 17/7

The Advanced Air Traffic Management System (AATMS) study was initiated by the Department of Transportation in an effort to evaluate various air traffic control concepts in the 1995 era. The purpose was to aid in the long-range planning of engineering and development, and to identify areas that appear the most promising for early initiation. The system proposed in this study to handle the traffic and provide the services required in 1995 is composed of extensions of the Upgraded Third Generation ATC System. This report summarizes the findings and recommendations of the MITRE/OSEM study. This study examined techniques and costs for alternative ways of building upon the 1982 Baseline ATC System. (Modified author abstract) GRA

N75-11920# Naval Intelligence Support Center, Washington, D.C. Translation Div.
KIVACH-1 AND KIVACH-2 MARINE NAVIGATION RADAR SETS
V. Ts. Fridman, V. M. Malyshev, and V. V. Blinov 4 Sep. 1974 153 p refs Transl. into ENGLISH of the book "Suddovye Navigatisionnye Radiolokatsionnye Stantsii Kivach-1 i Kivach-2" Moscow, Food Industry Publishing House, 1971 p 3-168
(AD-785338; NISC-Trans-3583) Avail: NTIS CSCL 17/9

The new Kivach-1 and Kivach-2 radar sets can be used on small seagoing vessels; they differ from older marine radar equipment by the fact that they are more reliable in operation at closer ranges and have automated anti-interference and control systems. They incorporate novel and ingenious engineering concepts which will serve as a source of great interest to radio specialists. GRA

N75-11921# McDonnell-Douglas Electronics Co., St. Charles, Mo.
SYNCHRONIZATION STATION LOCATION STUDY: TRADE-OFF PHASE Final Report, Nov. 1973 - May 1974
J. M. Holt and F. D. Watson May 1974 75 p refs
(Contract DOT-FA73WA-3172; FAA Proj. 052-241-026)
(AD-785335; FAA-RD-74-117) Avail: NTIS CSCL 17/7

Techniques were developed and applied in making trade-off evaluations of the overall synchronization effectiveness of various levels of airborne vs ground-based hierarchal time relaying equippage. It is shown that the number of ground-based master stations required to supply a desired level of synchronization coverage to all aircraft (hierarchal and non-hierarchal), increases rapidly as the number of hierarchal aircraft is diminished. Trade-off studies were made of the master station site selection algorithms. It was shown that the priority algorithm is very near optimum. However, choices of alternate sets of sites (such as air traffic hubs) can be used to obtain operational or economic advantages with only slight reduction in overall effectiveness. Author (GRA)

N75-11922# Aerospace Guidance and Metrology Center, Newark Air Force Station, Ohio.
A DESCRIPTION OF A LIFE CYCLE COST MODEL FOR INERTIAL NAVIGATION SYSTEMS Final Report
Thomas D. Meitzler and Russell M. Genet 13 Jun. 1974 50 p refs
(AD-785392; AGMC-74-014II) Avail: NTIS CSCL 17/7

The purpose of this report is to document a mathematical model that has been used to evaluate the potential life cycle costs of inertial navigation systems. The model has been previously published, however, because of sensitive data, it had a limited distribution. This report includes deficitions of all input and output parameters, explanations of algorithms for the model, a sample run using fictitious data and a program listing which includes a sensitivity study. Author (GRA)

N75-11923# Mitre Corp., McLean, Va.
AN ADVANCED AIR TRAFFIC MANAGEMENT CONCEPT BASED ON EXTENSIONS OF THE UPGRADED THIRD GENERATION ATC SYSTEM. SYSTEM B: ATC AUTOMATION ANALYSIS
A. N. Sinha Feb. 1974 65 p refs
(Contract DOT-FA70WA-2448)
(AD-785312; MTR-6419-Ser-7; FAA-EM-73-10A-Ser-7) Avail: NTIS CSCL 17/7

The AATMS study was initiated in an effort to evaluate various concepts of fourth generation air traffic control in the 1995 era. This report discusses the ATC automation requirements of the control center configurations of an upgraded third generation ATC system. Computer sizing estimates are presented for all the control centers in the System B 1995 configuration. Cost estimates, in current dollars, for the computer systems, based on existing technology, are also presented. GRA

N75-11924# Mitre Corp., McLean, Va.
AN ADVANCED AIR TRAFFIC MANAGEMENT CONCEPT BASED ON EXTENSIONS OF THE UPGRADED THIRD GENERATION ATC SYSTEM. SYSTEM B: SYSTEM COST ANALYSIS
A. N. Sinha Sep. 1973 64 p refs
(Contract DOT-FA70WA-2448)
(AD-785313; MTR-6419-Ser-8; FAA-EM-73-10A-Ser-8) Avail: NTIS CSCL 17/7

The AATMS study was initiated to evaluate various concepts of fourth generation air traffic control in the 1995 era. The purpose was to aid in the long-range planning of research and development, and to identify areas that appear the most promising for early preparation for the fourth generation. The report discusses the system cost analysis of an extension of the upgraded third generation ATC system. Cost estimates are presented for the surveillance, communications, and navigation subsystems as well as for the control centers and controller staffing. GRA

N75-11925# Mitre Corp., McLean, Va.
AN ADVANCED AIR TRAFFIC MANAGEMENT CONCEPT BASED ON EXTENSIONS OF THE UPGRADED THIRD GENERATION ATC SYSTEM. SYSTEM B: DISCRETE ADDRESS BEACON SYSTEM (DABS) ACCURACY AND COVERAGE REQUIREMENTS
V. P. Gupta and A. Haines Feb. 1974 63 p refs
(Contract DOT-FA70WA-2248)
(AD-785311; MTR-6419-Ser-5; FAA-EM-73-10A-Ser-5) Avail: NTIS CSCL 17/7

The report develops the DABS system configuration for the Advanced Air Traffic Management System (AATMS), System B,

and evaluates the coverage provided by the resulting 291 DABS sites. More than 90% of the CONUS is found to be covered down to 3,000: AGL under a four-thirds earth assumption. The report also develops the IFR spacing standards and the navigation and surveillance requirements sufficient for AATMS, System B, to handle the projected 1995 nominal demand load. Two worst cases have been chosen, the New York to Chicago corridor for the en route case, and the Los Angeles Basin for the terminal case. GRA

N75-11926# Mitre Corp., McLean, Va.
AN ADVANCED AIR TRAFFIC MANAGEMENT CONCEPT BASED ON EXTENSIONS OF THE UPGRADED THIRD GENERATION ATC SYSTEM. SYSTEM B: 1995 LOS ANGELES BASIN TRAFFIC MODEL, VOLUME 1
A. D. Mundra Mar. 1974 90 p refs
(Contract DOT-FA70WA-2448)
(AD-785309; MTR-6419-Ser-4-Vol-1; FAA-EM-73-10A-Ser-4-Vol-1) Avail: NTIS CSCL 17/7

A model of air traffic in the Los Angeles basin for the 1995 time frame is developed in this document. Details of annual operations demand projections for the basin including a distribution of loads over airports are provided. This demand is then translated into a typical peak instant traffic picture (snapshot of the airspace) and estimates of the busy hub hour loads for airports. The snapshot is summarized for various characteristics such as user type, flight type, altitude distributions and speed distributions. GRA

N75-11927# Mitre Corp., McLean, Va.
AN ADVANCED AIR TRAFFIC MANAGEMENT CONCEPT BASED ON EXTENSIONS OF THE UPGRADED THIRD GENERATION ATC SYSTEM. SYSTEM B: 1995 LOS ANGELES BASIN TRAFFIC MODEL, VOLUME 2
A. D. Mundra Mar. 1974 128 p
(Contract DOT-FA70WA-2448)
(AD-785310; MTR-6419-Ser-4-Vol-2; FAA-EM-73-10A-Ser-4-Vol-2) Avail: NTIS CSCL 17/7

The volume contains the complete set of arrival/departure matrices and its supporting data, used for the generation of the snapshot of Los Angeles 1995 airspace (Appendix B). This snapshot is listed in its entirety (Appendix C). Also included are summary statistics on the snapshot in the form of density maps of the basin by altitude bands and detailed altitude and speed statistics for important flight categories (Appendix D). GRA

N75-11928# Mitre Corp., McLean, Va.
AN ADVANCED AIR TRAFFIC MANAGEMENT CONCEPT BASED ON EXTENSIONS OF THE UPGRADED THIRD GENERATION ATC SYSTEM. SYSTEM B: AIR TRAFFIC ACTIVITY PROJECTIONS FOR 1995
D. Goldman Mar. 1974 89 p
(Contract DOT-FA70WA-2448)
(AD-785308; MTR-6419-Ser-3; FAA-EM-73-10A-Ser-3) Avail: NTIS CSCL 17/7

The report describes a set of projected 1995 air traffic activity data for use in evaluation of advanced air traffic management system concepts. Included in the projections are the aircraft fleets and operations rates for the air carrier, general aviation and military markets. Airport activity rates are estimated on an annual basis and instantaneous airborne counts are developed for a typical peak period. GRA

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.*

N75-11929*# Michigan Univ., Ann Arbor.
FRICTION AND TEMPERATURE RISE IN AIRCRAFT TIRES
S. K. Clark and R. J. Staples Mar. 1974 78 p refs
(Grant NGR-23-005-417)
(NASA-CR-134666; DRDA-036390-3-F) Avail: NTIS HC $4.75 CSCL 11J

The role of runway thermal conductivity in extending the operating range of pneumatic rubber aircraft tires in investigated. Measurements are made to determine the location of heat generation in the rolling tire and the contact resistance between the tire and the roadway. The approximate heat transfer characteristics between tire and runway are estimated for evaluating improvements in life and behavior of a skidding tire due to runway cooling. Author

N75-11930*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
NUMERICAL METHODS FOR THE DESIGN AND ANALYSIS OF WINGS AT SUPERSONIC SPEEDS
Harry W. Carlson and David S. Miller Washington Dec. 1974 76 p refs
(NASA-TN-D-7713; L-9542) Avail: NTIS HC $4.75 CSCL 01B

Numerical methods for the design and analysis of arbitrary-planform wings at supersonic speeds are reviewed. Certain deficiencies are revealed, particularly in application to wings with slightly subsonic leading edges. Recently devised numerical techniques which overcome the major part of these deficiencies are presented. The original development as well as the more recent revisions are subjected to a thorough review. Author

N75-11931*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
A WIND-TUNNEL INVESTIGATION OF PARAMETERS AFFECTING HELICOPTER DIRECTIONAL CONTROL AT LOW SPEEDS IN GROUND EFFECT
William T. Yeager, Jr., Warren H. Young, Jr., and Wayne R. Mantay Washington Nov. 1974 176 p refs
(NASA-TN-D-7694; L-9325) Avail: NTIS HC $7.00 CSCL 01B

An investigation was conducted in the Langley full-scale tunnel to measure the performance of several helicopter tail-rotor/fin configurations with regard to directional control problems encountered at low speeds in ground effect. Tests were conducted at wind azimuths of 0 deg to 360 deg in increments of 30 deg and 60 deg and at wind speeds from 0 to 35 knots. The results indicate that at certain combinations of wind speed and wind azimuth, large increases in adverse fin force require correspondingly large increases in the tail-rotor thrust, collective pitch, and power required to maintain yaw trim. Changing the tail-rotor direction of rotation to top blade aft for either a pusher tail rotor (tail-rotor wake blowing away from fin) or a tractor tail rotor (tail-rotor wake blowing against fin) will alleviate this problem. For a pusher tail rotor at 180 deg wind azimuth, increases in the fin/tail-rotor gap were not found to have any significant influence on the overall vehicle directional control capability. Changing the tail rotor to a higher position was found to improve tail-rotor performance for a fin-off configuration at a wind azimuth of 180 deg. A V-tail configuration with a pusher tail rotor with top blade aft direction of rotation was found to be the best configuration with reqard to overall directional control capability. Author

N75-11932*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
SUBSONIC WIND TUNNEL INVESTIGATION OF A TWIN-ENGINE ATTACK AIRPLANE MODEL HAVING NONMETRIC POWERED NACELLES
Vernard E. Lockwood and Aniello Matarazzo (Fairchild Republic Co.) Washington Nov. 1974 135 p refs
(NASA-TN-D-7742; L-9569) Avail: NTIS HC $5.75 CSCL 01B

A 1/10-scale powered model of a twin-engine attack airplane was investigated in the Langley high-speed 7- by 10-foot tunnel. The study was made at several Mach numbers between 0.225 and 0.75 which correspond to Reynolds numbers, based on the mean aerodynamic chord, of 1.35 million and 3.34 million. Unheated compressed air was used for jet simulation in the nonmetric engine nacelles which were located ahead of and above the horizontal stabilizer. Author

N75-11933*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

A MOTION-CONSTRAINT LOGIC FOR MOVING-BASE SIMULATORS BASED ON VARIABLE FILTER PARAMETERS

G. Kimball Miller, Jr. Washington Dec. 1974 55 p refs
(NASA-TN-D-7777; L-9585) Avail: NTIS HC $4.25 CSCL 01B

A motion-constraint logic for moving-base simulators has been developed that is a modification to the linear second-order filters generally employed in conventional constraints. In the modified constraint logic, the filter parameters are not constant but vary with the instantaneous motion-base position to increase the constraint as the system approaches the positional limits. With the modified constraint logic, accelerations larger than originally expected are limited while conventional linear filters would result in automatic shutdown of the motion base. In addition, the modified washout logic has frequency-response characteristics that are an improvement over conventional linear filters with braking for low-frequency pilot inputs. During simulated landing approaches of an externally blown flap short take-off and landing (STOL) transport using decoupled longitudinal controls, the pilots were unable to detect much difference between the modified constraint logic and the logic based on linear filters with braking. Author

N75-11934# Research Inst. of National Defence, Stockholm (Sweden).

INFORMATION ON ATTACK HELICOPTERS: A COMPARISON [SAMMANSTAELLING AV UPPGIFTER OM ATTACKHELIKOPTRAR]

Curt Haglund Feb. 1973 58 p In SWEDISH
(FOA-2-C-2597-F8) Avail: NTIS HC $4.25

The experience from the war in Vietnam and simulated trials show that the attack helicopter equipped with anti-tank rockets, is a very effective weapon against tanks because it avoids enemy anti-aircraft fire provided suitable tactics are employed. The report mentions some war experiences and the extensive tests which have been carried out and also describes types of attack helicopters and weapon systems for them. In conclusion, a brief reference is made to the next generation of attack helicopters in the U.S.A. Author

N75-11935*# Rockwell International Corp., Los Angeles, Calif. Aircraft Div.

THEORETICAL PREDICTION OF THICK WING AND PYLON-FUSELAGE-FANPOD-NACELLE AERODYNAMIC CHARACTERISTICS AT SUBCRITICAL SPEEDS. PART 1: THEORY AND RESULTS

J. R. Tulinius 24 Jul. 1974 248 p refs
(Contract NAS2-7904)
(NASA-CR-137578) Avail: NTIS HC $7.50 CSCL 01C

The theoretical development and the comparison of results with data of a thick wing and pylon-fuselage-fanpod-nacelle analysis are presented. The analysis utilizes potential flow theory to compute the surface velocities and pressures, section lift and center of pressure, and the total configuration lift, moment, and vortex drag. The skin friction drag is also estimated in the analysis. The perturbation velocities induced by the wing and pylon, fuselage and fanpod, and nacelle are represented by source and vortex lattices, quadrilateral vortices, and source frustums, respectively. The strengths of these singularities are solved for simultaneously including all interference effects. The wing and pylon planforms, twists, cambers, and thickness distributions, and the fuselage and fanpod geometries can be arbitrary in shape, provided the surface gradients are smooth. The flow through nacelle is assumed to be axisymmetric. An axisymmetric center engine hub can also be included. The pylon and nacelle can be attached to the wing, fuselage, or fanpod. Author

N75-11936*# Rockwell International Corp., Los Angeles, Calif. Aircraft Div.

THEORETICAL PREDICTION OF THICK WING AND PYLON-FUSELAGE-FANPOD-NACELLE AERODYNAMIC CHARACTERISTICS AT SUBCRITICAL SPEEDS. PART 2: COMPUTER PROGRAM DESCRIPTION

J. Kojima and J. R. Tulinius 24 Jul. 1974 340 p
(Contract NAS2-7904)
(NASA-CR-137579) Avail: NTIS HC $9.50 CSCL 01C

The procedures required to operate the thick wing and pylon fuselage-fanpod-nacelle computer program are presented. The program computes surface velocities and pressure, section loads, and total configuration loads and pitching moment. Potential flow theory is used to compute the surface pressures and the associated lift, moment, and vortex drag. The skin friction drag is also computed. Author

N75-11937*# Lockheed-Georgia Co., Marietta.

PROGRAM FOR ESTABLISHING LONG-TIME FLIGHT SERVICE PERFORMANCE OF COMPOSITE MATERIALS IN THE CENTER WING STRUCTURE OF C-130 AIRCRAFT. PHASE 3: FABRICATION Final Technical Report, Feb. 1973 - Jun. 1974

W. E. Harvill and A. O. Kays Sep. 1974 118 p refs
(Contract NAS1-11100)
(NASA-CR-132495; LG74ER0145) Avail: NTIS HC $5.25 CSCL 01C

The manufacturing plan for three C-130 aircraft center wing box test articles, selectively reinforced with boron-epoxy composites, is outlined for the following tasks: (1) tooling; (2) metal parts fabrication: (3) reinforcing laminate fabrication; (4) laminate-to-metal parts bonding; and (5) wing box assembly. The criteria used for reliability and quality assurance are discussed, and several solutions to specific manufacturing problems encountered during fabrication are given. For Vol. 1, see N73-13011; for Vol. 2, see N73-22929. A.A.D.

N75-11938# Technische Hochschule, Aachen (West Germany). Inst. fuer Luft- und Raumfahrt.

SHORT COURSE ON STOL AIRCRAFT TECHNOLOGY AND THE COMMUNITY, VOLUME 1

1974 470 p refs Partly in GERMAN; partly in ENGLISH Conf. held at Aachen, 18-22 Mar. 1974 and Tullahoma, Tenn., 22-26 Apr. 1974 Prepared jointly with Univ. of Tenn. Space Inst.
Avail: NTIS HC $11.50

Topics in the field of short takeoff aircraft and their significance to the community are presented. A survey of STOL aircraft systems is given, and the design criteria are discussed. Some typical STOL projects are detailed. Problems related to high lift devices are surveyed. Special attention is given to noise problems. Comparisons with conventional means of short haul transportation are made. For individual titles, see N75-11939 through N75-11945.

N75-11939 Vereinigte Flugtechnische Werke-Fokker G.m.b.H., Bremen (West Germany).

VERTICAL AND SHORT TAKE-OFF DEMONSTRATED BY THE VAK 191 B

Rolf Riccius *In* Tech. Hochschule Aachen Short Course on STOL Aircraft Technol. and the Community, Vol. 1 1974 87 p refs (For availability see N75-11938 03-05)

The concepts of jet supported STOL or V/STOL are considered, and design problems and handling qualities are discussed with a view to creating a better understanding between conventional STOL and jet-borne STOL and V/STOL aircraft. The design methods and test results of the VAK 191 B experimental aircraft are used as a reference to discuss some of the problem areas and highlight the handling qualities of this aircraft. ESRO

N75-11940 Lockheed-Georgia Co., Marietta.

STOL AIRCRAFT DESIGN APPROACHES: NOISE CONSIDERATIONS AND PERFORMANCE TRADEOFFS

Harold S. Sweet *In* Tech. Hochschule Aachen Short Course on STOL Aircraft Technol. and the Community, Vol. 1 1974 64 p (For availability see N75-11938 03-05)

A number of different lift concepts for STOL aircraft were evaluated to considerable depth. These are discussed from the standpoint of the following evaluation parameters: fuel consumption, direct operating cost, return of investment, versatility, and flexibility. The lift concepts evaluated are: externally blown flap, augmentor wing, over-the-wing blowing systems, blowing boundary layer control, internally blown flap, and mechanical flap with and without vectored thrust. Noise levels were compared for the different concepts. ESRO

N75-11941 Messerschmitt-Boelkow-Blohm G.m.b.H., Hamburg (West Germany).
EUROPLANE QTOL: A EUROPEAN PROJECT PROPOSAL
Heribert Flosdorff *In* Tech. Hochschule Aachen Short Course on STOL Aircraft Technol. and the Community, Vol. 1 1974 45 p (For availability see N75-11938 03-05)

A design philosophy for an aircraft capable of utilizing the existing infrastructure of airfields and air traffic control systems is presented. A considerable reduction in noise levels is expected and sufficient flexibility provided for adaption to future changes in operating procedures, and traffic control and guidance control systems. Design criteria are detailed, and performance characteristics presented graphically. ESRO

N75-11942 Messerschmitt-Boelkow-Blohm G.m.b.H., Hamburg (West Germany).
EUROPLANE QTOL: DESIGN PARAMETER TRADEOFFS c07
Dieter Burkhardt *In* Tech. Hochschule Aachen Short Course on STOL Aircraft Technol. and the Community, Vol. 1 1974 44 p (For availability see N75-11938 03-05)

Design parameter tradeoffs, performed on a commercial transport aircraft of the 180 to 200 scale category, are discussed. Constraints imposed were a fixed configuration, fixed engines, e.g. RB211, and a fixed flap system. The high sensitivity of aircraft direct operating cost (DOC) with respect to the specification assumed is pointed out. The field length, especially, has severe implications on DOC. ESRO

N75-11943 Tennessee Univ. Space Inst., Tullahoma.
AERODYNAMICS OF HIGH-LIFT DEVICES
W. F. Jacobs *In* Tech. Hochschule Aachen Short Course on STOL Aircraft Technol. and the Community, Vol. 1 1974 75 p refs (For availability see N75-11938 03-05)

The requirement for a good and effective high lift system for the development of STOL aircraft is discussed and various methods of greatest interest are considered. The aerodynamic characteristics of the systems are compared and evaluated. Theoretical methods for calculating the aerodynamic forces on powered high lift systems are also included. ESRO

N75-11944 Tennessee Univ. Space Inst., Tullahoma.
AIR CUSHION LANDING SYSTEMS FOR AIRCRAFT
B. H. Goethert *In* Tech. Hochschule Aachen Short Course on STOL Aircraft Technol. and the Community, Vol. 1 1974 29 p refs (For availability see N75-11938 03-05)

Short takeoff aircraft current state-of-the-art is briefly summarized. Aircraft equipped with an air cushion landing system have the capability of operating on prepared and unprepared surfaces, such as hard runways, water, swamps, slush and loose snow without necessitating any changes of the landing system. These systems have the characteristic that they permit an airplane to move not only in the longitudinal direction, as is the normal case as airplanes equipped with wheels, but also in the lateral or any other direction as desired. Detailed descriptions of the aircushions, the auxiliary cushion air compressor system, the control system for ground operation, etc., are given. The feasibility of the system was demonstrated in extensive tests. ESRO

N75-11945 Bodenseewerk Geraetetechnik G.m.b.H., Ueberlingen (West Germany).
ASPECTS OF GUIDANCE AND CONTROL FOR STEEP AND CURVED APPROACHES OF STOL AIRCRAFT
Gunther W. Schaenzer *In* Tech. Hochschule Aachen Short Course on STOL Aircraft Technol. and the Community, Vol. 1 1974 44 p refs (For availability see N75-11938 03-05)

A newly-developed STOL flight control system designed to relieve pilot load and to permit accurate path control and precise control of the aerodynamic state of flow with greater passenger comfort was investigated. The characteristics of the new system were demonstrated with a Dornier Skyservant aircraft and more than 500 fully automatic landing have been made. The tests include approach, flare, and ground roll down to 24 knots I.A.S., and the automatic landing capacity is demonstrated. ESRO

N75-11946# Technische Hochschule, Aachen (West Germany). Inst. fuer Luft- und Raumfahrt.
SHORT COURSE ON STOL AIRCRAFT TECHNOLOGY AND THE COMMUNITY, VOLUME 2
1974 332 p refs Conf. held at Aachen, 18-22 Mar. 1974 and Tullahoma, Tenn., 22-26 Apr. 1974 Prepared jointly with Univ. of Tenn. Space Inst.
Avail: NTIS HC $9.50

For abstract, see N75-11938 For individual titles, see N75-11947 through N75-11952.

N75-11947 Du Pont Aerospace Co., Inc., Torrance, Calif.
ENGINES FOR COMMERCIAL STOL TRANSPORTS c07
A. A. duPont *In* Tech. Hochschule Aachen Short Course on STOL Aircraft Technol. and the Community, Vol. 2 1974 19 p (For availability see N75-11946 03-05)

High bypass turbofan models are selected on the basis of noise, operating economics, and reliability. A compromise among thermodynamic factors, bypass ratio, and mechanical arrangements is suggested taking into account existing examples. ESRO

N75-11948 Motoren- und Turbinen-Union Muenchen G.m.b.H. (West Germany).
PROPULSION CONCEPTS FOR STOL AIRCRAFT
H. Grieb, W. Klussmann, and G. Weist *In* Tech. Hochschule Aachen Short Course on STOL Aircraft Technol. and the Community, Vol. 2 1974 58 p refs (For availability see N75-11946 03-05)

In view of the possibility of applying STOL capabilities to jet transport aircraft, the technical scope for developing high bypass cruise engines and for designing air supply systems for wings with internally blown flaps are identified and dealt with. The effect of bypass ratio on static and takeoff thrust and on general dimensioning is considered. Engine noise and technical problems are elucidated. Experimental results on air supply requirements and noise emission of airfoils with externally blown flaps and various concepts for internally blown flaps are depicted. Various air supply systems are reviewed and compared. ESRO

N75-11949 Messerschmitt-Boelkow-Blohm G.m.b.H., Hamburg (West Germany).
INVESTIGATIONS INTO AIRCRAFT NOISE REDUCTION BY SHIELDING c07
Gerd Saphir *In* Tech. Hochschule Aachen Short Course on STOL Aircraft Technol. and the Community, Vol. 2 1974 36 p refs (For availability see N75-11946 03-05)

Flyover noise shielding is achieved by the specific positioning of engines with respect to wings and airframe. Noise shielding formulas are compared and experimental results are presented graphically. ESRO

N75-11950 Tennessee Univ. Space Inst., Tullahoma.
SOME RESULTS OF AEROACOUSTIC RESEARCH c07
B. H. Goethert *In* Tech. Hochschule Aachen Short Course on STOL Aircraft Technol. and the Community, Vol. 2 1974 13 p refs (For availability see N75-11946 03-05)

Research on special noise producing characteristics of unconventional exhaust nozzles such as multicircular nozzles, slot nozzles, and nozzles with flaps as noise shields, is reported. Studies have been initiated on exhaust jets, which mix with secondary air underneath a shroud. Such a configuration has a region of high turbulence, and thus also of intense noise shielded from the outside, and discharges the exhaust jet into the atmosphere at greatly reduced velocities, leading to overall exhaust noise reduction. Some calculations were carried out in order to determine the potential of these configurations. Initial test results with shrouds equipped with internal noise attenuating liners confirmed the predicted potential. ESRO

N75-11951 Technische Hochschule, Aachen (West Germany).
NOISE OF JETS WHICH ARE IMPINGING ON OBSTACLES (FOR EXAMPLES EXTERNALLY BLOWN FLAPS) AND POSSIBILITIES OF NOISE ATTENUATION c07
G. Neuwerth *In* Tech. Hochschule Aachen Short Course on STOL Aircraft Technol. and the Community, Vol. 2 1974 16 p refs (For availability see N75-11946 03-05)

The acoustic mechanism of the noise radiation caused by a subsonic (or supersonic) free jet impinging on an obstacle was studied. The natural orderly structure of turbulence of a subsonic

free jet at Mach numbers between 0.5 and 1.0 was examined, and the reinforcement of the first harmonic of the axisymmetric structure by the feedback mechanism established. The interaction noise was amplified by an externally blown flap as an obstacle. The ring vortices reinforced by feedback can be destroyed if they are cut off at one point of their periphery and the total sound power level can be reduced about 10 db. Results show that the natural orderly structure cannot be destroyed but only weakened. ESRO

N75-11952 Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio.

DEVELOPMENT AND APPLICATIONS OF THE AIR CUSHION LANDING SYSTEM

K. H. Digges *In* Tech. Hochschule Aachen Short Course on STOL Aircraft Technol. and the Community, Vol. 2 1974 24 p refs (For availability see N75-11946 03-05)

The use of an air cushion system fitted to an aircraft to permit it to land on unfavorable and unsuitable terrain where an aircraft with conventional landing gear would get bogged down is discussed. A suitable braking system to be used in conjunction with the air cushion system is described. Flight tests with a Lake LA-4 amphibian aircraft fitted with the system showed such impressive results that a program has been initiated to fit the system to a 40,000 lb gross weight De Havilland Buffalo transport. ESRO

N75-11953# Illinois Univ., Savoy. Aviation Research Lab.

CONTROL AUTHORITY WITH A FLIGHT PERFORMANCE CONTROLLER

Craig A. Bergman, Kenneth R. Sivier, and Stanley N. Roscoe Oct. 1973 9 p refs Presented at the 17th Ann. Meeting of the Human Factors Soc., Washington, D. C., 16-18 Oct. 1973 (Contract F44620-70-C-0105; AF Proj. 9778)

(AD-784889; ARL/73-23/AFOSR-73-14; AFOSR-74-1351TR) Avail: NTIS CSCL 01/3

A performance control system (PCS) that allows direct pilot control of aircraft bank angle and vertical speed has been developed and flight tested in a twin-engine general aviation aircraft. The control-response relationships are discussed for both the conventional controls and the PCS. The reduction of control authority with the PCS and the resulting flying qualities are presented. Author (GRA)

N75-11954# Naval Ship Research and Development Center, Bethesda, Md. Aviation and Surface Effects Dept.

TWO-DIMENSIONAL SUBSONIC EVALUATION OF A 15-PERCENT THICK CIRCULATION CONTROL AIRFOIL WITH SLOTS AT LEADING AND TRAILING EDGES

Jonah Ottensoser Jul. 1974 65 p refs (WF41421210)

(AD-785230; Aero-1197; NSRDC-4456) Avail: NTIS CSCL 01/1

A 15-percent-thick circulation control elliptical airfoil section with slots at both leading and trailing edges for tangential blowing was evaluated in a subsonic wind tunnel to determine its potential for high-speed (300-400 knot) helicopter rotor systems. Fore-and-aft slot utilization were determined by local flow direction over the blade as it revolved around the azimuth. Aerodynamic performance was not affected by the addition of an unblown leading edge slot except beyond the usable positive angle of attack range where some loss in lift and increase in drag were noted. At equal plenum pressures, simultaneous blowing from the leading and trailing edges resulted in a decrease in lift, an increase in drag, and a more positive pitching moment than for trailing edge blowing alone. (Modified author abstract) GRA

N75-11955# Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio.

A SPECTRUM TRUNCATION AND DAMAGE TOLERANCE STUDY ASSOCIATED WITH THE C-5A OUTBOARD PYLON AFT TRUSS LUGS

J. P. Gallagher, H. D. Stalnaker, and J. L. Rudd May 1974 52 p refs (AF Proj. 410A)

(AD-785196; AFFDL-TR-74-5) Avail: NTIS CSCL 01/3

A simplified lug specimen configuration is subjected to two load spectra derived from the same exceedance data: (1) a 17 level block loading program, and (2) a 14-mission flight-by-flight loading program. Crack growth data from the two spectra for this PH 13-8Mo material are compared on a life basis; each spectrum contained an equal number of Ground Air Ground (GAG) cycles per lifetime. An analysis of the effect associated with the degree of truncation to which the flight spectrum could be subjected was performed using the conservative no retardation - no load interaction crack growth model and the Willenborg crack growth retardation model. The stress intensity factor calibration developed using finite element techniques is supplemented with stress intensity factor values obtained using the Anderson - James inverse approach. Additional tests on 7075-T6 aluminum are described which investigate the importance of load redundancy. Author (GRA)

N75-11956# Budd Co., Fort Washington, Pa. Technical Center.

DESIGN AND MOCKUP EVALUATION OF A HIGH-STRENGTH ARMORED CREW SEAT FOR TRANSPORT/CARGO AIRCRAFT

Edwin W. Hammer, Jr. and Richard L. Peterson Jun. 1974 134 p refs

(Contract F33615-71-C-1411; AF Proj. 1425)

(AD-785145; AFFDL-TR-73-47) Avail: NTIS CSCL 01/3

Conceptual layout drawings of six armored crew seat systems for use in transport/cargo aircraft were developed and evaluated. The initial seating concepts included attenuation in all three axes. In one of the early concepts, the effect of sliding friction during the attenuation stroke was completely eliminated by allowing certain key components to rotate to gain the necessary translation. In the final design, attenuation was obtained by sliding on conventional tracks; however, attenuation in the lateral direction was eliminated because lateral space and weight became critical. To obtain the most efficient seat system in terms of cost, weight, and space, concurrent studies were conducted to investigate armor materials, energy absorbers, restraint systems, seat cushions and head rests to determine the most efficient parameters for each. As a result, boron carbide was chosen for the armor, a commercially available energy absorber known as Tor-Shok for the attenuators, and a modified F-111 harness for the restraint system; and the material thickness and dimensions for the seat cushion and head rest were defined. (Modified author abstract) GRA

N75-11957# General Dynamics/Convair, San Diego, Calif.

INTERACTIVE COMPUTER-AIDED DESIGN AIRCRAFT FLYING QUALITIES PROGRAM. VOLUME 1: USERS MANUAL Final Report, 1 Jan. - Aug. 1974

G. Place, H. M. Altmann, L. G. Barbee, G. F. Campbell, Jr., and E. R. Neuharth Aug. 1974 266 p refs

(Contracts F33615-74-C-4068; F33615-73-C-4081; AF Proj. C093)

(AD-785101; ASD/XR-74-17-Vol-1) Avail: NTIS CSCL 01/1

This report describes a digital computer program which calculates the longitudinal and lateral-directional stability and control derivatives and aircraft flying qualities for a Mach number range for 0 - 3.0. The report consists of four volumes. Volume I, Users Manual, contains a detailed description of the input/output options, program limitations, input/output data, and a set of sample problems. Volume IV, Program Assessment/Correlation Report, presents the results of the correlation studies and conclusions pertaining to the validity of the methodology. The computer program is written in FORTRAN IV Extended language for the CDC 6600 operating system. However, it is designed to be adapted to other operating systems because use of unique features peculiar to a given processor has been avoided whenever practical. User oriented features are included in the program to provide minimum input data requirements, flexible input/output control options and substitution of experimental data for aerodynamic characteristics. (Modified author abstract) GRA

N75-11958# General Dynamics/Convair, San Diego, Calif.

INTERACTIVE COMPUTER-AIDED DESIGN AIRCRAFT FLYING QUALITIES PROGRAM. VOLUME 2: METHODS FORMULATION MANUAL Final Report, 1 Jan. - Aug. 1974

G. Place, H. M. Altmann, L. G. Barbee, G. F. Campbell, Jr., and E. R. Neuharth Aug. 1974 132 p refs

(Contracts F33615-74-C-4068; F33615-73-C-4081; AF Proj. C093)
(AD-785102; ASD/XR-74-17-Vol-2) Avail: NTIS CSCL 01/1

This report describes a digital computer program which calculates the longitudinal and lateral-directional stability and control derivatives and aircraft flying qualities for a Mach number range for 0 - 3.0. The report consists of four volumes. Volume II, Methods Formulation Manual, outlines the methodology and source, range of applicability, and modifications. (Modified author abstract) GRA

N75-11959# General Dynamics/Convair, San Diego, Calif.
INTERACTIVE COMPUTER-AIDED DESIGN AIRCRAFT FLYING QUALITIES PROGRAM. VOLUME 3: COMPUTER PROGRAMMING MANUAL Final Report, 1 Jan. - Aug. 1974
G. Place, H. M. Altmann, L. G. Barbee, G. F. Campbell, Jr., and E. R. Neuharth Aug. 1974 457 p
(Contracts F33615-74-C-4068; F33615-73-C-4081; AF Proj. C093)
(AD-785103; ASD/XR-74-17-Vol-3) Avail: NTIS CSCL 01/1

This report describes a digital computer program which calculates the longitudinal and lateral-directional stability and control derivatives and aircraft flying qualities for a Mach number range for 0 - 3.0. Volume III, Computer Programming Manual, outlines the program organization, input/output of each module/subroutine, module or subroutine function, program listings and flow charts. The computer program is written in FORTRAN IV Extended language for the CDC 6600 operating system. (Modified author abstract) GRA

N75-11960# General Dynamics/Convair, San Diego, Calif.
INTERACTIVE COMPUTER-AIDED DESIGN AIRCRAFT FLYING QUALITIES PROGRAM. VOLUME 4: PROGRAM ASSESSMENT/CORRELATION REPORT Final Report, 1 Jan. - Aug. 1974
G. Place, H. M. Altmann, L. G. Barbee, G. F. Campbell, Jr., and E. R. Neuharth Aug. 1974 203 p refs
(Contracts F33615-74-C-4068; F33615-73-C-4081; AF Proj. C093)
(AD-785104; ASD/XR-74-17-Vol-4) Avail: NTIS CSCL 01/1

This report describes a digital computer program which calculates the longitudinal and lateral-directional stability and control derivatives and aircraft flying qualities for a Mach number range for 0 - 3.0. The report consists of four volumes. Volume IV, Program Assessment/Correlation Report, presents the results of the correlation studies and conclusions pertaining to the validity of the methodology. (Modified author abstract) GRA

N75-11961# Systems Associates, Inc., Long Beach, Calif.
U. S. ARMY HELICOPTER ELECTRICAL SYSTEM RELIABILITY AND MAINTAINABILITY INVESTIGATION. VOLUME 1: DOCUMENT DEFICIENCY ANALYSIS Final Report
Clifford E. Nord May 1974 261 p refs
(Contract DAAJ02-73-C-0020; DA Proj. 1F1-62203-A-119)
(AD-785573; SAI-R73-011-1-Vol-1; USAAMRDL-TR-73-97A-Vol-1) Avail: NTIS CSCL 01/3

The investigation was performed in order to identify deficiencies in military specifications and standards concerning electrical systems in U.S. Army helicopters. The three areas of concern that have impact on helicopter reliability and maintainability are: Design requirements; qualification test requirements, procedures, and practices; and quality assurance provisions and requirements. The helicopters selected are the AH-1G Cobra, UH-1D/H Iroquois, OH-6A Cayuse, CH-47A Chinook, and the CH-54A Tarhe. Schematics of each model helicopter electrical system were analyzed, and a composite schematic was constructed to represent all circuits, equipments, and component parts of all models. This composite schematic provided a baseline system on which to build an electrical system documentation tree. Author (GRA)

N75-11962# Systems Associates, Inc., Long Beach, Calif.
U. S. ARMY HELICOPTER ELECTRICAL SYSTEM RELIABILITY AND MAINTAINABILITY INVESTIGATION. VOLUME 2: SUPPLEMENTAL DESIGN GUIDE
Clifford E. Nord May 1974 291 p refs
(Contract DAAJ02-73-C-0020; DA Proj. 1F1-62203-A-119)
(AD-785574; SAI-R73-011-2-Vol-2; USAAMRDL-TR-73-97B-Vol-2) Avail: NTIS CSCL 01/3

The volume is a result of the investigation performed in Volume I Document Deficiency Analysis of this report, which identifies deficiencies in military specifications and standards that have impact in reliability and maintainability of U.S. Army helicopters. The volume provides supplementary information to each deficient document relating to design requirements, qualification testing, and quality assurance. The supplementary information to offset the most prevalent deficiencies were addressed to helicopter mission design requirements which relate to environmental conditions, reliability and maintainability programs, and safety. Environmental testing and reliability and maintainability requirements were also addressed. This supplementary information may be used for future helicopter procurement purposes, or may eventually be incorporated into existing aircraft electrical systems documents. Author (GRA)

N75-11963# Army Material Command, Texarkana, Tex. Intern Training Center.
USE OF CHOLESTERIC LIQUID CRYSTALS FOR LOCATING VOIDS IN ADHESIVELY BONDED HELICOPTER ROTOR BLADES Final Report
Larry V. Best Mar. 1974 52 p refs
(AD-785502; USAMC-ITC-02-08-73-029) Avail: NTIS CSCL 01/3

This paper researches the feasibility for using cholesteric liquid crystals for locating the unbonded areas or voids in adhesively bonded helicopter rotor blades. Results of testing two tail rotors are presented and analyzed. A general review of other nondestructive testing methods for rotor blades and a review of liquid crystals is also included. Author (GRA)

N75-11964# Army Aviation Systems Test Activity, Edwards AFB, Calif.
ENGINEERING FLIGHT TEST, AH-1G HELICOPTER, HEAVYWEIGHT AUTOROTATIONAL EVALUATION Final Report
Joseph C. Watts, George M. Yamakawa, Leslie J. Hepler, and Leonard M. Free May 1974 29 p refs
(AD-785553; USAASTA-74-10) Avail: NTIS CSCL 01/3

Engineering flight tests were conducted by the United States Army Aviation Systems Test Activity to determine if any adverse autorotational entry or landing characteristics would preclude increasing the maximum operational gross weight of the AH-1G helicopter above the current 9500 pounds. A production AH-1G helicopter with tractor tail rotor was flown 14.4 hours at Edwards Air Force Base, California between 26 September and 12 October 1973 in the Hog configuration. Autorotational entries were performed successfully at gross weights from 9000 to 10,000 pounds from climbs, level flight, and dives. (Modified author abstract) GRA

N75-11965# Army Materiel Command, Alexandria, Va.
ENGINEERING DESIGN HANDBOOK: HELICOPTER PERFORMANCE TESTING
1 Aug. 1974 262 p refs
(AD-785000; AMCP-706-204) Avail: NTIS CSCL 01/3

As the state of the art advances, the helicopter becomes more complex with accompanying difficulties in the development cycle. Also, the customer organizations become larger, more efficient, demand more reliability and accuracy, and in general, refine their capability in all areas. The manufacturers and government in turn are forced to provide more comprehensive and accurate information about the product, thus requiring an ever increasing flight test effort. This handbook discusses flight testing as it relates to helicopter performance determinations. GRA

N75-11966# Explosive Technology, Inc., Fairfield, Calif.
AN EMERGENCY LIFE SAVING INSTANT EXIT SYSTEM FOR CARGO, CARGO-TRANSPORT AND PASSENGER AIRCRAFT, VOLUME 2 Technical Report, Jun. 1971 - May 1973
M. C. Anderson and Frank B. Burkdoll Feb. 1974 31 p refs
(Contract F33657-70-C-1138)
(AD-778824; ASD-TR-71-41-Vol-2) Avail: NTIS CSCL 06/7

The results of flight testing phase of an Emergency Life-Saving

Instant Exit (ELSIE) System for military and commercial cargo, cargo-transport and passenger aircraft are described. ELSIE System opens emergency exits in aircraft almost instantaneously and can be designed to open all exits at one time or on a selective basis. The Flight-Test Directorate of the Aeronautical Systems Division, Air Force Systems Command, Wright-Patterson Air Force Base, Ohio, performed the described testing. The design evolved from Explosive Technology's STEN (Stored Energy) Passenger Egress System originally developed in 1967 and continuously demonstrated since then. This document is Volume 2 of a two-volume report. Volume 1 describes the design and ground-test phases of the program. Author (GRA)

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography*.

N75-11967# Beckman Instruments, Inc., Fullerton, Calif. Advanced Technology Operations.

OXYGEN CONCENTRATION SENSOR FOR AIRCRAFT FUEL TANKS Final Technology Report, 1 Nov. 1972 - 5 May 1974

Jean Bordeaux and M. W. Greene May 1974 54 p
(Contract F33615-73-C-2008; AF Proj. 3048)
(AD-785144; FR-2653-102; AFAPL-TR-74-17) Avail: NTIS CSCL 07/4

The ullage in aircraft fuel tanks becomes potentially explosive when the oxygen concentration of the fuel vapor-air mixture exceeds approximately 9% by volume. To insure effective and efficient use of active fuel tank inerting under a wide range of environmental and operational conditions, the oxygen concentration must be continuously monitored. This study has resulted in the development of a laboratory breadboard model of a sensor which is specific for oxygen. The concept employs a change in frequency of a radio-frequency (RF) oscillator due to the paramagnetic property of oxygen. Demonstration of feasibility was limited to ambient laboratory conditions. Author (GRA)

N75-11968# Naval Air Development Center, Warminster, Pa. Air Vehicle Technology Dept.

CLEANING AND CORROSION CONTROL OF AVIONICS EQUIPMENT AT ALL LEVELS OF MAINTENANCE Progress Report

W. E. MacKenzie and W. E. Knight 30 Apr. 1974 21 p
(AD-784975; NADC-74049-30) Avail: NTIS CSCL 01/3

This report covers a survey of cleaning and corrosion problems encountered with avionics systems, the application of a new cleaner for components, and a process for corrosion control of avionics components and systems at the three maintenance levels. Author (GRA)

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N75-11969# Committee on Science and Astronautics (U. S. House).

AIRCRAFT NOISE ABATEMENT

Washington GPO 1974 1041 p refs Hearings before Subcomm. on Aeron. and Space Technol. of Comm. on Sci. and Astronaut., 93d Congr., 2d Sess., No. 44, 24-25 Jul. 1974; 5, 6, and 18 Dec. 1973
(GPO-41-298) Avail: Subcomm. on Aeron. and Space Technol.

Various proposals were suggested by witnesses from established airports, aircraft manufacturing firms, and government agencies at the aircraft noise abatement hearings in Congress. Noise contours for Los Angeles International Airport are included, along with proposed structural changes in engine design to reduce noise. J.A.M.

N75-11970*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

DISTORTION IN A FULL-SCALE BICONE INLET WITH INTERNAL FOCUSED COMPRESSION AND 45 PERCENT INTERNAL CONTRACTION

Joseph F. Wasserbauer, Harvey E. Neumann, and Robert J. Shaw Washington Dec. 1974 54 p refs
(NASA-TM-X-3133; E-7992) Avail: NTIS HC $4.25 CSCL 21E

The distortion characteristics were investigated at the subsonic diffuser exit of a full-scale, Mach 2.5, axisymmetric, mixed compression inlet. Performance and steady-state distortion characteristics were obtained at zero and maximum angle of attack and during an inlet unstart-restart sequence. For the configuration with no cowl bleed, steady-state distortion P(max)P(min)P(bar) ranged from 0.10 for critical inlet operation at 0 deg angle-of-attack to 0.306 for supercritical inlet operation at 6.84 deg angle-of-attack. Vortex generators provided a 50 percent reduction in steady-state distortion for critical operation. Bleed has a smaller effect on steady-stated distortion. Author

N75-11971*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

CONTINUOUS-OUTPUT TERMINAL-SHOCK-POSITION SENSOR FOR MIXED-COMPRESSION INLETS EVALUATED IN WIND TUNNEL TESTS OF YF-12 AIRCRAFT INLET

Miles O. Dustin, Gary L. Cole, and George H. Neiner Washington Dec. 1974 25 p refs
(NASA-TM-X-3144; E-7808) Avail: NTIS HC $3.25 CSCL 21E

An electronic sensor was built to measure the position of the terminal shock in a supersonic inlet. The sensor uses several static-pressure taps in the inlet wall. The sensor output is continuously proportional to shock position. When the sensor was installed in a YF-12 aircraft flight inlet during wind tunnel tests, it indicated shock position within + or - 5 percent of the total distance covered by the static-pressure-tap region. The maximum error caused by an angle of attack change of 4 deg was less than 25 percent. In the region of normal inlet operation, the angle of attack error is negligible. Frequency-response tests show the amplitude ratio is constant out to 60 Hz, and decreases to about 50 percent at 100 Hz, with a phase lag of 50 deg. Author

N75-11972*# Pratt and Whitney Aircraft, West Palm Beach, Fla. Research and Development Center.

EFFECT OF SWIRLING FLOW ON AUGMENTOR PERFORMANCE Final Report, Jun. 1973 - Jun. 1974

T. R. Clements Nov. 1974 90 p refs Original contains color illustrations
(Contract NAS3-17348)
(NASA-CR-134639; FR-6534) Avail: NTIS HC $4.75 CSCL 21E

A test program was conducted with an augmentor which employed swirling flow as a means of promoting rapid flame propagation. The program evaluated the effect of augmentor length, swirl intensity, fuel zoning and Mach number on augmentor performance. Combustion efficiencies near 100% were demonstrated over most of the operating range which extended from an equivalence ratio of 0.2 to over 1.0. The tests were conducted at an inlet temperature of 649 C (1200 F) and at a pressure of 2 atmospheres. The augmentor total pressure losses were typical of current state of the art augmentors. Author

N75-11973*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

A FOREBODY DESIGN TECHNIQUE FOR HIGHLY INTEGRATED BOTTOM-MOUNTED SCRAMJETS WITH APPLICATION TO A HYPERSONIC RESEARCH AIRPLANE

C. L. W. Edwards Nov. 1974 40 p refs
(NASA-TM-X-71971) Avail: NTIS HC $3.75 CSCL 21A

An inviscid technique for designing forebodies which produce uniformly precompressed flows at the inlet entrance for bottom-mounted scramjets has been developed so that geometric constraints resulting from design trade-offs can be effectively evaluated. The flow fields resulting from several forebody designs generated in support of a hypersonic research airplane conceptual design study have been analyzed in detail with three-dimensional characteristics calculations to verify the uniform flow conditions. For the designs analyzed, uniform flow is maintained over a wide range of flight conditions (Mach number equals 4 to 10; angle of attack equals 6 deg to 10 deg) corresponding to scramjet operation flight envelope of the research airplane. Author

N75-11974*# Princeton Univ., N.J. Guggenheim Lab. for the Aerospace Propulsion Sciences.
FUNDAMENTAL AND APPLIED RESEARCH ON CORE ENGINE/COMBUSTION NOISE OF AIRCRAFT ENGINES Annual Report
E. G. Plett, M. D. Leshner, and M. Summerfield Jul. 1974 32 p refs
(Grant NGR-31-001-307)
(NASA-CR-140860; AR-1) Avail: NTIS HC $3.75 CSCL 21E

Some results of a study of the importance of geometrical features of the combustor to combustion roughness and resulting noise are presented. Comparison is made among a perforated can flame holder, a plane slotted flame holder and a plane slotted flame holder which introduces two counter swirling streams. The latter is found to permit the most stable, quiet combustion. Crosscorrelations between the time derivative of chamber pressure fluctuations and far field noise are found to be stronger than between the far field noise and the direct chamber pressure signal. Temperature fluctuations in the combustor nozzle are also found to have a reasonably strong crosscorrelation with far field sound. Author

N75-11975# Technische Universitaet, Hanover (West Germany).
OPTIMIZATION OF CARBON DIOXIDE GAS TURBINE LOOPS Ph.D. Thesis [OPTIMIERUNG VON GESCHLOSSENEN CO2-GASTURBINENANLAGEN]
Sanat Kumar Mukherjee 6 May 1974 268 p refs In GERMAN
Avail: NTIS HC $8.50

Optimization of CO2 gas turbine secondary loops connected to sodium cooled fast breeder reactors requires a simple supercritical thermodynamic or condensation regime with partial flow compression as well as high turbine inlet temperatures. Transl. by G.G.

N75-11976# Aeronautical Research Labs., Melbourne (Australia).
CONSTANT-VOLUME GAS TURBINE: EXPERIMENTS WITH GASEOUS FUEL IN BUTTERFLY VALVED COMBUSTORS
B. G. Catchpole and A. Runacres May 1974 25 p refs
(ARL/ME-Note-347) Avail: NTIS HC $3.25

Periodic combustors were tested for their capacity to burn gaseous propane in air admitted through a continuously rotating butterfly valve. The test were part of a feasibility study of the type of intermittent combustion which would be involved in a gas turbine utilizing the constant volume cycle. The geometry of each combustor and the reasoning which led to it are described along with a few quantitive results. Author

N75-11977# Royal Aircraft Establishment, Farnborough (England).
LIQUID METAL COOLING OF TURBINE BLADES
E. LeGrives and J. Genot Oct. 1974 33 p refs Transl. into ENGLISH from the French Presented at the AGARD Conf. on High Temp. Turbines, Florence, 1970
(RAE-Lib-Trans-1713; BR44233) Avail: NTIS HC $3.75

Mass transfer conditions in thermosyphon or evaporative cycles under high centrifugal acceleration are briefly analyzed. Sodium potassium alloys are shown to be best suited on account of their heat transfer ability with air cooled exchangers at the blade roots. A high rotation speed test set-up on which the heat flux on the blades is comparable to that of a real turbine has been extensively used for an experimental study of these processes. Both cycles lead to a temperature drop as high as 650 C at the blade tips, with a mass flow rate of cooling air of 10g/s kW. However, several advantages are shown to be expected for the evaporative cycle in view its application to high temperature gas turbine cooling. Author

N75-11978*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EFFECT OF TREATED LENGTH ON PERFORMANCE OF FULL SCALE TURBOFAN INLET NOISE SUPPRESSORS
James H. Dittmar and John F. Groeneweg Washington Dec. 1974 77 p refs
(NASA-TN-D-7826; E-7999) Avail: NTIS HC $4.75 CSCL 21E

Two inlet noise suppressors containing wall treatment plus three treated rings were tested on a fan in an outdoor noise facility. Sound power attenuations were measured for three treated lengths of each suppressor. The noise reduction from the segment of liner closest to the fan, which contained a segment of wall treatment downstream of the splitter rings, was greater than the reduction from either of the other segments. The decibel attenuations of the ringed liner segments were linear with liner length as predicted by theory. The acoustic attenuation of the wall treatment was considerably greater than expected for available theory. This inordinate effectiveness of the wall treatment strongly suggests the possibility of using no-ring inlet suppressors when the required noise reduction is moderate. The decibel attenuations were higher than predicted above 2000 hertz, and the two suppressors behaved similarly despite the prediction of different behavior. Author

N75-11979# Hawker Siddeley Aviation, Ltd., Hatfield (England). Aerodynamics Dept.
ATMOSPHERIC ATTENUATION OF AIRCRAFT NOISE. EXPERIMENTAL VALVES MEASURED IN A RANGE OF CLIMATIC CONDITIONS, VOLUME 1 Final Report
Christine M. Smith Sep. 1973 211 p refs Sponsored by Ministry of Defence 2 Vol.
(HSA-HAD-R-GEN-214-Vol-1) Avail: NTIS HC $7.25 CSCL 20A

Experimental data was required for the purpose of assessing the standard atmospheric attenuation coefficients in current use and so controlled field measurements were made at eleven locations in the United States and Europe under more than twenty different climatic conditions in the range 0 to 35 C and 25% to 95% relative humidity. A Hawker Siddeley H.S. 125 aircraft provided the noise source, flying straight and level at various heights above a single measuring position. Meteorological data was sampled at altitude and at the noise measuring position during each flyover. Atmospheric attenuation coefficients for the one-third octave bands of frequency from 50 Hz to 10 kHz were derived from the aircraft noise recordings. Measurement procedures were selected so that the effects of ground reflection and absorption, background noise, Doppler shift and source directivity were almost entirely eliminated from the results. Author

N75-11980# Hawker Siddeley Aviation, Ltd., Hatfield (England). Aerodynamics Dept.
ATMOSPHERIC ATTENUATION OF AIRCRAFT NOISE. EXPERIMENTAL VALVES MEASURED IN A RANGE OF CLIMATIC CONDITIONS, VOLUME 2 Final Report
Christine M. Smith Sep. 1973 85 p refs Sponsored by Ministry of Defence 2 Vol.
(HSA-HAD-R-GEN-214-Vol-2) Avail: NTIS HC $4.75 CSCL 20A

For abstract, see N75-11979.

N75-11981# Research Inst. of National Defence, Stockholm (Sweden).
FUTURE SCIENTIFIC RESEARCH: THE ELITES NEW LATIN OR A NEW NAME FOR SOME OLD WAYS OF THINKING [FRAMTIDSFORSKNING: ELITENS NYA LATIN ELLER ETT NYTT NAMN FOER NAGRA GAMLA SAETT ATT TAENKA]
Stephan Schwarz Jan. 1973 27 p refs In SWEDISH
(FOA-P-C-8347-M5) Avail: NTIS HC $3.75 CSCL 20A

Some critical points of view and ideas are put forward to illustrate the role of future scientific research as an element in the solution of the problem of responsibility in the process of decision making. Author

N75-11982*# Lockheed-California Co., Burbank.
MEASUREMENT AND ANALYSIS OF AIRCRAFT FAR-FIELD AERODYNAMIC NOISE Final Report
Gerald J. Healy Washington NASA Dec. 1974 71 p refs (Contract NAS1-12440)
(NASA-CR-2377; LR-26195) Avail: NTIS HC $4.25 CSCL 20A

A systematic investigation of aircraft far-field radiated, aerodynamically generated noise was conducted. The test phase of the original program involved the measurement of the noise produced by five gliding aircraft in an aerodynamically clean configuration during low altitude flyovers. These aircraft had gross weights that ranged from 5785 to 173 925N (1300 to 39,000 pounds), fly-by velocities from 30 to 98.5m/sec (58 to 191.5 knots or 98 to 323 ft/sec) and wing aspect ratios from 6.59 to 18.25. The results of these measurements were used to develop an equation relating aerodynamic noise to readily evaluated physical and operational parameters of the aircraft. A non-dimensional frequency spectrum, based on the mean wing thickness, was also developed. Author

N75-11983*# General Electric Co., Cincinnati, Ohio.
CASCADE TESTS OF SERRATED LEADING EDGE BLADING AT HIGH SUBSONIC SPEEDS Final Report
E. G. Smith Washington NASA Dec. 1974 94 p refs (Contract NAS2-5462)
(NASA-CR-2472) Avail: NTIS HC $5.75 CSCL 21E

Cascade tests of two-dimensional fan rotor blade rows were performed to investigate the effects of leading edge serration on acoustic and aerodynamic performance. The test configurations covered a range of serration tooth geometries. Tests were performed to investigate effects of inlet air angle and velocity on performance. Aerodynamic performance was determined by flow surveys at the mid-span of the blade exit. Acoustic performance was determined by wake turbulence surveys and sound measurements in the semireverberent exhaust chamber. Measured acoustic and aerodynamic performance was comparable and indicated that a serration length of about six percent blade chord yields minimum noise generation and minimum total pressure losses. Author

N75-11984*# Boeing Commercial Airplane Co., Seattle, Wash.
A 727/JT8D-100 SERIES ENGINE EXHAUST SYSTEM PROPULSION PERFORMANCE MODEL TEST
W. J. Haugan and P. R. A. Kern May 1974 424 p (Contract NAS3-17842)
(NASA-CR-134817; D6-41805) Avail: NTIS HC $10.50 CSCL 21E

The results are presented from testing one-eighth scale models of the Pratt and Whitney aircraft reference and Boeing nozzles for the JT8D-100 series mixed flow engines. The objective of the test was to obtain the nozzle velocity and flow coefficients for the reference configurations and compare these with the Boeing configurations which incorporated a longer splitter between the fan and primary flows. A further comparison was made between the JT8D-100 series nozzles and the Boeing JT8D-9/727 production nozzle performance. A statistical analysis was used to compare configurations which showed the performance (velocity coefficient) of the reference and the Boeing configuration was the same for the JT8D-109. It also showed no difference between reference and the Boeing configuration for the JT8D-115 and no difference for the JT8D-117 nozzles. Bypass ratio (match) was shown to be equally dependent on splitter position as on nozzle area within the range investigated. The nozzles were very similar in flow coefficient within an engine family. Excellent profile data was recorded. The effects of swirl on the nozzle performance was examined and found to degrade the velocity and flow coefficients. Author

N75-11985*# Boeing Co., Wichita, Kans.
ACOUSTIC ATTENUATION DESIGN REQUIREMENTS ESTABLISHED THROUGH EPNL PARAMETRIC TRADES
Henry F. Veldman 1972 248 p refs (Contract NAS3-14321)
(NASA-CR-120986; D3-8686) Avail: NTIS HC $7.50 CSCL 20A

An optimization procedure for the provision of an acoustic lining configuration that is balanced with respect to engine performance losses and lining attenuation characteristics was established using a method which determined acoustic attenuation design requirements through parametric trade studies using the subjective noise unit of effective perceived noise level (EPNL). Author

N75-11986# Naval Air Engineering Center, Philadelphia, Pa. Ground Support Equipment Dept.
IN-AIRFRAME GROUND RUNUP NOISE SUPPRESSOR PROGRAM Final Report
Eugene T. Pulcher 15 Mar. 1974 121 p refs
(AD-785246; NAEC-GSED-78) Avail: NTIS CSCL 01/3

An effort to control the noise generated by twelve (12) different aircraft in the Navy inventory was undertaken. Existing Suppressor Systems were studied. Design parameters were established and optimized through computer studies. Author (GRA)

N75-11987*# Pratt and Whitney Aircraft, West Palm Beach, Fla. Research and Development Center.
TURBINE GAS TEMPERATURE MEASUREMENT AND CONTROL SYSTEM Final Report, 1 Apr. 1972 - 30 Sep. 1973
William L. Webb Dec. 1973 114 p refs Sponsored by NASA
(AF Proj. 3066)
(NASA-CR-140971; AD-784901; PWA-FR-6094; AFAPL-TR-73-116) Avail: NTIS HC $5.25 CSCL 21/5

A fluidic Turbine Inlet Gas Temperature (TIGT) Measurement and Control System was developed for use on a Pratt and Whitney Aircraft J58 engine. Based on engine operating requirements, criteria for high temperature materials selection, system design, and system performance were established. To minimize development and operational risk, the TIGT control system was designed to interface with an existing Exhaust Gas Temperature (EGT) Trim System and thereby modulate steady-state fuel flow to maintain a desired TIGT level. Extensive component and system testing was conducted including heated (2300F) vibration tests for the fluidic sensor and gas sampling probe, temperature and vibration tests on the system electronics, burner rig testing of the TIGT measurement system, and in excess of 100 hours of system testing on a J58 engine. (Modified author abstract) GRA

N75-11988# AiResearch Mfg. Co., Phoenix, Ariz.
SMALL TURBINE ENGINE NOISE REDUCTION. VOLUME 5: DATA TABULATIONS Final Report, 7 May 1971 - 31 May 1973
Richard N. Tedrick and George T. Kantarges Dec. 1973 360 p
(Contract F33615-71-C-1457)
(AD-780576/5; AiResearch-73-210285-5; AFAPL-TR-73-79-Vol-5) Avail: NTIS HC $10.00 CSCL 21/5

Volume 5 of AFAPL-TR-73-79 contains tabulations of the measured engine data developed under the Small Turbine Engine Noise Reduction Study. The data is presented as tabulated listings of the one-third octave band sound pressure level for each engine configuration, each engine load point, and at each microphone position. Sound power level tabulations have also been included, to allow comparison of the effectiveness of the various hardware configurations on the basis of the sound power level. This volume also contains the impedance and acoustic absorption data sheets for those materials and material constructions not reported in Volume 3. In addition, the complete tabulated data from the standing wave (impedance) tube apparatus material tests is presented. (Modified author abstract) GRA

N75-11989# Bolt, Beranek, and Newman, Inc., Canoga Park, Calif.
COMMUNITY NOISE EXPOSURE RESULTING FROM AIRCRAFT OPERATIONS: COMPUTER PROGRAM OPERATION'S MANUAL Final Report
Nicolaas H. Reddingius Jul. 1974 218 p refs
(Contract F33615-74-C-4160; AF Proj. 7231)
(AD-785360; BBN-2582; AMRL-TR-73-108) Avail: NTIS CSCL 20/1

A user oriented description of a computer program to calculate community noise exposure due to aircraft operations is given.

Formal definition of all allowable card sequences and examples of coding for all types of aircraft operations are presented as well as guidelines for efficient use. The program which is entirely written in FORTRAN 4 produces printed output as well as output compatible with the CALCOMP GPCP contouring package. A discussion of the architecture of the program and the interpretation of the output can be found in companion volumes AMRL-TR-109 and AMRL-TR-73-105, respectively. Author (GRA)

N75-11990# Georgia Inst. of Tech., Atlanta. School of Aerospace Engineering.
COMBUSTION GENERATED NOISE IN TURBOPROPULSION SYSTEMS Interim Report, Jun. 1973 - May 1974
W. C. Strahle, B. N. Shivashankara, J. C. Handley, and M. Muthukrishnan Jan. 1974 70 p refs
(Grant AF-AFOSR-2365-72; AF Proj. 9711)
(AD-785485; AFOSR-74-1438TR) Avail: NTIS CSCL 21/2

Continuation of experimental and theoretical work on the problem of combustion generated noise in turbopropulsion systems is presented. Tasks completed during the current period have been (a) experimental and theoretical correlation of noise power and spectra from open premixed flames of propane, propylene, ethylene and acetylene-air, (b) crosscorrelation of C2 emission with the far field acoustic pressure, and (c) experimental and theoretical investigation of ducting effects upon the noise radiating capability of the flame. The noise radiation from simple flame types is now understood with sufficient theoretical and experimental detail that estimates may be made for combustion noise in turbopropulsion systems. (Modified author abstract) GRA

N75-11991# Pennsylvania State Univ., University Park. Applied Research Lab.
EFFECT OF BLADE ROW GEOMETRY ON AXIAL FLOW ROTOR UNSTEADY RESPONSE TO INFLOW DISTORTIONS
Robert E. Henderson and Edgar P. Bruce 18 Jul. 1974 34 p refs
(Contract N00017-73-C-1418)
(AD-785276; TM-74-224) Avail: NTIS CSCL 21/5

Employing a recently developed experimental apparatus, the authors have measured the unsteady response of an isolated axial flow fan rotor to inflow distortions. The measured quantities include the unsteady normal force and pitching moment on a segment of a single blade operating at various mean angles of attack and the associated distribution of time-mean total pressure change across the rotor. These results are part of a larger program that includes variations in the mean angle of attack in reduced frequency omega, in blade stagger angle, and in blade row space-to-chord ratio (S/C). The effect of variations in omega and S/C on the unsteady response are presented. (Modified author abstract) GRA

N75-11992# Princeton Univ., N.J. Dept. of Aerospace and Mechanical Sciences.
RESEARCH ON NOISE GENERATED BY DUCTED AIR-FUEL COMBUSTION SYSTEMS Annual Report, Mar. 1973 - Feb. 1974
E. G. Plett, H. H. Chiu, and M. Summerfield Jun. 1974 30 p refs
(Contract N00014-67-A-0151-0029)
(AD-785028; AR-3) Avail: NTIS CSCL 21/5

A two-pronged approach to the study of noise generation by combustion in a confined flow system, similar to a jet engine configuration, has been followed. One aspect deals with the mechanisms of noise generation by combustion; the other aspect deals with the effect of confinement on the noise generation and radiating properties of an unsteady combustion-duct-flow interaction. Mechanisms of sound generation, amplification and scattering by various combustion systems have been studied on theoretical bases compatible with the contemporary understanding of unsteady burning processes. Sound generation mechanisms are classified into categories relating to the Smith-Kilham emission mechanism and the turbulent driven Rijke-Riess emission mechanism. (Modified author abstract) GRA

N75-11993# Rochester Applied Science Associates, Inc., N.Y.
DEVELOPMENT OF AN IMPROVED DESIGN TOOL FOR PREDICTING AND SIMULATING HELICOPTER ROTOR NOISE Final Report
H. Kevin Johnson Jun. 1974 48 p refs
(Contract DAAJ02-73-C-0061; DA Proj. 1F1-62204-AA-43)
(AD-785579; RASA-74-02; USAAMRDL-TR-74-37) Avail: NTIS CSCL 20A

The rotor noise prediction program has been improved by the following items: (1) inclusion of the helicopter rotor noise ground reflection phenomenon, (2) inclusion of the variability of oscillatory forces as related to the vortex shedding phenomenon, (3) expansion of the data base for the broadband noise data bank, and (4) description of a calculation procedure which demonstrates how the program input deck can be modified to account for impulse signals of single-rotor blade vortex interactions. The rotor noise prediction program has been developed so that the acoustic characteristics of new, untested rotor designs could be evaluated as well as the effects of basic design changes on the acoustic signature of existing rotors. (Modified author abstract) GRA

N75-11994# Colt Industries, Inc., West Hartford, Conn. Chandler Evans Control Systems Div.
TURBINE ENGINE FUEL CONTROL RELIABILITY TEST AND EVALUATION Final Report, 20 Jun. 1973 - 22 Mar. 1974
R. D. Zagranski, R. M. Lamart, and A. H. White Jul. 1974 94 p refs
(Contract DAAJ02-73-C-0104; DA Proj. 1F1-62205-A-119)
(AD-785580; USAAMRDL-TR-74-53) Avail: NTIS CSCL 21/5

This report describes the results of an 8-month fuel control reliability test program to evaluate new dynamic fuel seals, ultrafine fuel filtration and the vibration susceptibility of the Chandler Evans TA-2S hydromechanical fuel control. Previous studies conducted under Army Contract DAAJ02-72-C-0110 identified these areas as potential generic design deficiencies in hydromechanical controls. (Modified author abstract) GRA

N75-11995# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
FIGHTER AIRCRAFT ENGINE DEPENDABILITY VERSUS RECONNAISSANCE AIRCRAFT ENGINE DEPENDABILITY WHEN BOTH AIRCRAFT USE THE SAME ENGINE M.S. Thesis
Anthony J. Pansza and Don F. Woods Aug. 1974 142 p refs
(AD-785444; SLSR-01-74B) Avail: NTIS CSCL 21/5

The technique currently used to forecast engine removals considers specific engine-aircraft combinations. If there is a significant difference in dependability of the same engine used in different aircraft it might be possible to redefine the engine-aircraft combination when forecasting and thus lower costs through a reduction or reallocation of the overall engine inventory. The F4 weapon system was selected as a study vehicle to analyze the effect of aircraft use or mission on engine dependability because the GE J79-15 engine is installed in different models of the F4 aircraft that are used for basically different purposes: reconnaissance and fighter-bomber missions. Engine failure data was obtained over an eight year period and statistically analyzed. (Modified author abstract) GRA

N75-11996# Hamilton Standard, Windsor Locks, Conn.
MULTIPLE FAULT GAS PATH ANALYSIS APPLIED TO TF30-P-408 ENGINE DATA Final Report
Joseph M. Kos Jun. 1974 130 p
(Contract N00140-74-C-0582)
(AD-785265; HSER-6587) Avail: NTIS CSCL 21/5

This report presents the results of a study made to demonstrate the validity and versatility of gas path Analysis as applied to multiple fault gas turbine engine diagnostics. Actual engine test data at static and simulated Mach number conditions is used. From eleven diagnostic systems considered, the two best systems are presented as FORTRAN 4 subroutines for use by NAPTC. Results based on both empirical and theoretical considerations are presented. Author (GRA)

N75-11942 Messerschmitt-Boelkow-Blohm G.m.b.H., Hamburg (West Germany).
EUROPLANE QTOL: DESIGN PARAMETER TRADEOFFS
Dieter Burkhardt *In* Tech. Hochschule Aachen Short Course

on STOL Aircraft Technol. and the Community, Vol. 1 1974 44 p (For availability see N75-11938 03-05)

N75-11947 Du Pont Aerospace Co., Inc., Torrance, Calif.
ENGINES FOR COMMERCIAL STOL TRANSPORTS
A. A. duPont *In* Tech. Hochschule Aachen Short Course on STOL Aircraft Technol. and the Community, Vol. 2 1974 19 p (For availability see N75-11946 03-05)

N75-11949 Messerschmitt-Boelkow-Blohm G.m.b.H., Hamburg (West Germany).
INVESTIGATIONS INTO AIRCRAFT NOISE REDUCTION BY SHIELDING
Gerd Saphir *In* Tech. Hochschule Aachen Short Course on STOL Aircraft Technol. and the Community, Vol. 2 1974 36 p refs (For availability see N75-11946 03-05)

N75-11950 Tennessee Univ. Space Inst., Tullahoma.
SOME RESULTS OF AEROACOUSTIC RESEARCH
B. H. Goethert *In* Tech. Hochschule Aachen Short Course on STOL Aircraft Technol. and the Community, Vol. 2 1974 13 p refs (For availability see N75-11946 03-05)

N75-11951 Technische Hochschule, Aachen (West Germany).
NOISE OF JETS WHICH ARE IMPINGING ON OBSTACLES (FOR EXAMPLES EXTERNALLY BLOWN FLAPS) AND POSSIBILITIES OF NOISE ATTENUATION
G. Neuwerth *In* Tech. Hochschule Aachen Short Course on STOL Aircraft Technol. and the Community, Vol. 2 1974 16 p refs (For availability see N75-11946 03-05)

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

No abstracts in this category.

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N75-11997*# National Aeronautics and Space Administration. Pasadena Office, Calif.
ANNULAR ARC ACCELERATOR SHOCK TUBE Patent Application
Lewis P. Leibowitz, inventor (to NASA) (JPL) Filed 6 Nov. 1974 22 p
(Contract NAS7-100)
(NASA-Case-NPO-13528-1; US-Patent-Appl-SN-521620) Avail: NTIS HC $3.25 CSCL 14B

The development of an annular arc accelerator shock tube to study the effects of shock entry into planetary atmospheres is reported. A cold gas driver is employed by the shock tube to flow a stream of gas from an expansion section through a high voltage electrode section to a test section thus driving a shock wave in front of it. A glow discharge detects the shock wave and actuates a trigger generator which in turn fires spark-gap switches to discharge a bank of capacitors across a centered cathode and an annular anode in tandem electrode sections as the initial shock wave passes through the anode section from the cathode section thereby depositing energy into the flow gas without the necessity of any diaphragm opening in the gas flow from the expansion section through the electrode sections.
NASA

N75-11998# Royal Aircraft Establishment, Farnborough (England).
TEMPERATURE MEASUREMENTS IN WIND TUNNELS
J. Bate Jun. 1974 52 p refs Transl. into ENGLISH from Deutsche Luft- und Raumfahrt Report DLR-MITT 72-27
(RAE-Lib-Trans-1736; BR42767; DLR-MITT-72-27) Avail: NTIS HC $4.25

Methods used for the measurement of temperature in wind tunnels of the DFVLR Institute for Applied Gas Dynamics by means of contact thermometers are surveyed. Indications of possible measuring errors and an estimation of accuracy are included. Reports that give a detailed description of special measuring techniques are discussed. Author

N75-11999*# Boeing Aerospace Co., Seattle, Wash.
FLIGHT CONTROL AND PROCEDURES FOR STIMULATED VISUAL APPROACH AND LANDING. SELF-PACED TRAINING PACKAGE
Verle E. Helsel and Thomas E. Sitterley Jan. 1974 104 p
(Contract NAS9-13550)
(NASA-CR-140335; D180-17875-1) Avail: NTIS HC $5.25 CSCL 14B

Experimental flight control and precedures training material is presented as a self-paced static training method. Cockpit familiarization, emergency procedures training, flight training, and a self-test are included. Author

N75-12000*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
THE CRYOGENIC WIND TUNNEL CONCEPT FOR HIGH REYNOLDS NUMBER TESTING
Robert A. Kilgore, Michael J. Goodyer (Southampton Univ.), Jerry B. Adcock, and Edwin E. Davenport Washington Nov. 1974 96 p refs
(NASA-TN-D-7762; L-9396) Avail: NTIS HC $4.75 CSCL 14B

Theoretical considerations indicate that cooling the wind-tunnel test gas to cryogenic temperatures will provide a large increase in Reynolds number with no increase in dynamic pressure while reducing the tunnel drive-power requirements. Studies were made to determine the expected variations of Reynolds number and other parameters over wide ranges of Mach number, pressure, and temperature, with due regard to avoiding liquefaction. Practical operational procedures were developed in a low-speed cryogenic tunnel. Aerodynamic experiments in the facility demonstrated the theoretically predicted variations in Reynolds number and drive power. The continuous-flow-fan-driven tunnel is shown to be particularly well suited to take full advantage of operating at cryogenic temperatures. Author

N75-12001*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
SIMULATION OF FLIGHT TEST CONDITIONS IN THE LANGLEY PILOT TRANSONIC CRYOGENIC TUNNEL
Robert A. Kilgore, Jerry B. Adcock, and Edward J. Ray Washington Dec. 1974 24 p refs
(NASA-TN-D-7811; L-9850) Avail: NTIS HC $3.25 CSCL 14B

The theory and advantages of the cryogenic tunnel concept are briefly reviewed. The unique ability to vary temperature independently of pressure and Mach number allows, in addition to large reductions in model loads and tunnel power, the independent determination of Reynolds number, Mach number, and aeroelastic effects on the aerodynamic characteristics of the model. Various combinations of Reynolds number and dynamic pressure are established to represent accurately flight variations of aeroelastic deformation with altitude changes. The consequences of the thermal and caloric imperfections of the test gas under cryogenic conditions were examined and found to be insignificant for operating pressures up to 5 atm. The characteristics of the Langley pilot transonic cryogenic tunnel are described and the results of initial tunnel operation are presented. Tests of a two-dimensional airfoil at a Mach number of 0.85 show identical pressure distributions for a chord Reynolds number of 8,600,000 obtained first at a stagnation pressure of 4.91 atm

at a stagnation temperature of 322.0 K and then at a stagnation pressure of 1.19 atm at a stagnation temperature of 116.5 K.
Author

N75-12002# National Aeronautical Establishment, Ottawa (Ontario).
REVERIFICATION OF THE NAE 100,000-LB DEADWEIGHT STANDARD FORCE MACHINE
S. R. Gwilt and E. B. Stimson Sep. 1974 28 p refs
(NRC-14354; LR-580) Avail: NTIS HC $3.75

The Canadian 100,000-lb standard deadweight machine was disassembled for reverification of the forces exerted by its suspended masses. The machine is described and the principles of force determination examined. The use of the observed data is outlined. A statistical analysis to demonstrate control of the balance operations is included. Sensitive areas such as temperature differential effects, buoyancy effects due to mixed material densities, and observation of gradual deterioration of balance sensitivity are examined. Final development indicated total uncertainties of the order of four parts per million associated with the listed forces.
Author

N75-12003*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
ANALYSIS AND COMPENSATION OF AN AIRCRAFT SIMULATOR CONTROL LOADING SYSTEM WITH COMPLIANT LINKAGE
Paul R. Johnson (Iowa State Univ. of Science and Technology, Ames) and Richard E. Bardusch Washington Dec. 1974 31 p refs
(NASA-TN-D-7747; L-9642) Avail: NTIS HC $3.25 CSCL 14B

A hydraulic control loading system for aircraft simulation was analyzed to find the causes of undesirable low frequency oscillations and loading effects in the output. The hypothesis of mechanical compliance in the control linkage was substantiated by comparing the behavior of a mathematical model of the system with previously obtained experimental data. A compensation scheme based on the minimum integral of the squared difference between desired and actual output was shown to be effective in reducing the undesirable output effects. The structure of the proposed compensation was computed by use of a dynamic programing algorithm and a linear state space model of the fixed elements in the system.
Author

N75-12004# Mitre Corp., Bedford, Mass.
CONSIDERATION OF NEAR FIELD EFFECTS IN MICROWAVE LANDING SYSTEM (MLS) FEASIBILITY EVALUATION
H. S. Marsh Jul. 1974 35 p
(Contract F19628-73-C-0001; AF Proj. 6430)
(AD-784854; MTR-2808; ESD-TR-74-184) Avail: NTIS CSCL 17/7

The near field MLS beam pattern may be troublesome if C-band flare guidance is used. One of the complications is introduced by defocusing or broadening of the beam received by an aircraft located in the near field of the antenna. With a C-band flare elevation subsystem, the antenna near field will extend a distance from the antenna sufficient to contain the aircraft during flare and touchdown, and so the precise characteristics of the near field signals must be understood. The effects of beam broadening on system accuracy and signal processing requirements are briefly examined, and experimental investigations are recommended. A short discussion of antenna aperture optimization is also presented, and parallels are drawn between Doppler MLS and synthetic aperture radar.
Author (GRA)

N75-12005# Avcon Universal Consultants Corp., Baden, Pa.
DEVELOPMENT OF MICROWAVE LANDING SYSTEM IMPLEMENTATION CRITERIA Final Report
Thomas L. Croswell Jul. 1974 50 p Sponsored by FAA
(AD-785220; AV-MLS-74-1; FAA-RD-74-121) Avail: NTIS CSCL 17/7

The study derives guidelines for MLS implementation planning from basic safety requirements for landing systems, from contemporary qualification criteria and from existing system status. A quantitative method is developed to facilitate evaluation of alternative MLS implementation plans, based on the conclusion that instrument approaches to ILS and MLS represent an increase in safety over approaches made to non-precision facilities. Substantiation of this conclusion, validation of the method, projection of instrument approaches and other steps leading to a detailed MLS implementation schedule are defined and their accomplishment recommended.
Author (GRA)

N75-12006# Rockwell International Corp., Columbus, Ohio. Missile Systems Div.
PILOT MODEL FOR AERO PROPULSION TEST SLED Final Report
R. C. Wykes and H. J. Peters Mar. 1974 362 p refs
(Contract F29601-71-C-0113; AF Proj. 589)
(AD-785125; AFSWC-TR-72-6) Avail: NTIS CSCL 14/2

The work conducted under this program consists of engineering and fabrication for modifying an existing three-stage outrigger rocket sled system and to design and fabricate an aerodynamic nose cone for testing a ramjet propulsion system at the Holloman AFB test track. The engineering performed consists of design, structural, loads and vibration analysis for total test sled systems by means of mathematical modeling. The ultimate objective is to conduct test sled track runs to prove the feasibility of testing high-speed ramjet systems by use of a high speed sled. A secondary objective was to design the mission sled modifications such that further modifications will be minimal when other payloads are mounted on the mission sled.
Author (GRA)

N75-12007# Air Force Civil Engineering Center, Tyndall AFB, Fla.
LIQUID ICE PREVENTION AND CONTROL CHEMICALS FOR USE ON AIRFIELD PAVEMENTS Interim Report, Jan. 1970 - Dec. 1973
Robert R. Rice Jul. 1974 54 p refs
(AD-785319; AFCEC-TR-74-4) Avail: NTIS CSCL 01/5

The objectives of the study covered by this report were (a) to identify and evaluate for effectiveness as ice prevention and control agents any proprietary formulations which were determined to be non-deleterious to aircraft metals and plastics; (b) to determine if the commercial chemicals have any detrimental effects to airfield paving materials either by surface deterioration or by producing a surface with undesirable frictional qualities; and (c) to determine the nature of any environmental effects which may result from use of the new ice control agents in SIRC (snow and ice removal and control) operations.
GRA

N75-12008# ARO, Inc., Arnold Air Force Station, Tenn.
APPLICATION OF LINEARIZED TRANSONIC THEORY TO TUNNEL BLOCKAGE INTERFERENCE Final Report, 1 Feb. - 30 Nov. 1973
C. F. Lo AEDC Sep. 1974 30 p refs
(AD-785349; AEDC-TR-74-65; ARO-PWT-TR-74-45) Avail: NTIS CSCL 14/2

Wind tunnel blockage interference is calculated by the application of linearized transonic theory. The linearized transonic perturbation equation is solved by the Fourier transform technique to obtain blockage interference in a perforated transonic wind tunnel in terms of pressure coefficient. The calculation has been used to determine the applicable Mach number range of subsonic tunnel corrections. An application to a circular arc airfoil is presented to demonstrate the accuracy of the blockage correction.
Author (GRA)

N75-12009# Ohio Univ., Athens. Dept. of Electrical Engineering.
INSTRUMENT LANDING SYSTEM IMPROVEMENT PROGRAM: ENVIRONMENTAL STUDY OF THE 200 FOOT APERTURE SLOTTED CABLE LOCALIZER ANTENNA ARRAY Interim Report
William E. Kennedy and Richard H. McFarland Apr. 1974 23 p refs
(Contract DOT-FA69WA-2066)
(AD-785025; EER-5-19; FAA-RD-74-94) Avail: NTIS CSCL 17/7

Results of an experimental program to determine the operational stability of the 200 ft. aperture course array of the Watts Prototype Company's slotted cable localizer array are presented. Particular attention is given to those times when snow,

ice, wind, and thunderstorms existed. Maximum course deviations of 2 microamperes were found with the far-field and integral course monitor. Generally the course held within 1 microampere and the width 2 microamperes. Author (GRA)

N75-12010# Rockwell International Corp., Columbus, Ohio. Missile Systems Div.
ENVIRONMENTAL INVESTIGATION OF PILOT PROPULSION TEST SLED Final Report
Alva Roy Glaser Mar. 1974 198 p refs
(Contract F29601-72-C-0131)
(AD-785134; AFSWC-TR-73-6) Avail: NTIS CSCL 14/2

The objective of the program was to demonstrate the applicability of the Holloman test track for performing captive tests of a ramjet engine at realistic supersonic flight conditions and to provide sled design data for future sled-borne aero propulsion systems. This objective was achieved by designing a series of four track test systems to increasingly higher performance levels, the fourth of which culminated in propelling a structurally sound flight test missile payload to a sustained velocity in excess of 2600 ft/sec for 3.6 seconds. The velocity profile is sufficient to proceed with ignition and testing of the payload ramjet engine. Author (GRA)

N75-12751* National Center for Atmospheric Research, Boulder, Colo. National Scientific Balloon Facility.
THE NATIONAL SCIENTIFIC BALLOON FACILITY
Robert S. Kubara *In* NASA. Ames Res. Center Telescope Systems for Balloon-Borne Res. Nov. 1974 p 156-159 (For availability see N75-12735 03-74)
CSCL 14B

N75-12835 Joint Publications Research Service, Arlington, Va.
ELECTRIC TOW TRUCK FOR PLANES DESCRIBED
Petur Milushev and Bonyu Teknedzhiev *In its* Transl. on Eastern Europe: Sci. Affairs, no. 440 (JPRS-63573) 3 Dec. 1974 p 13-15 Transl. into ENGLISH from Voenna Tekhn. (Sofia), no. 9, 1974 p 34-35 (For availability see N75-12832 03-81)

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N75-12011*# Martin Marietta Corp., Baltimore, Md.
SKYLAB PROGRAM PAYLOAD INTEGRATION. TO27 SAMPLE ARRAY Final Report
J. A. Muscari and P. A. Westcott 31 Jul. 1974 221 p
(Contract NAS8-24000)
(NASA-CR-120531; ED-2002-1744) Avail: NTIS HC $7.25 CSCL 22A

The objective of the TO27 sample array was to determine the change in optical properties of various transmissive windows, mirrors, and diffraction gratings caused by the deposition of contaminants found about the orbital assembly. The expected information to be obtained from the total TO27 sample array program is as follows: (1) effect of space contaminants on transmittance, reflectance, grating efficiency, and polarization; (2) variations in deposition of contaminants due to substrate, solar radiation, period of exposure, direction of exposure, and geometry effects; (3) identification of contaminants and source of evolution; (4) time of contaminant evolution and lingering time; and (5) guidelines for a model of spacecraft contamination.
Author

N75-12012*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
MISSION DESIGN FOR A BALLISTIC SLOW FLYBY COMET ENCKE 1980
R. W. Farquhar, D. K. McCarthy, D. P. Muhonen, and D. K. Yeomans (Computer Sciences Corp.) Washington Nov. 1974 37 p refs Presented at the 12th AIAA Aerospace Sci. Meeting, Washington, D. C., 31 Jan. 1974
(NASA-TN-D-7726; G-7508) Avail: NTIS HC $3.75 CSCL 22A

Preliminary mission analyses for a proposed 1980 slow flyby (7-9 km/s) of comet Encke are presented. Among the topics covered are science objectives, Encke's physical activity and ephemeris accuracy, trajectory and launch-window analysis, terminal guidance, and spacecraft concepts. The nominal mission plan calls for a near-perihelion intercept with two spacecraft launched on a single launch vehicle. Both spacecraft will arrive at the same time, one passing within 500 km from Encke's nucleus on its sunward side, the other cutting through the tail region. By applying a small propulsive correction about three weeks after the encounter, it is possible to retarget both spacecraft for a second Encke intercept in 1984. The potential science return from the ballistic slow flyby is compared with other proposed mission modes for the 1980 Encke flyby mission, including the widely advocated slow flyby using solar-electric propulsion. It is shown that the ballistic slow flyby is superior in every respect.
Author

N75-12013*# Kanner (Leo) Associates, Redwood City, Calif.
VISITING THE SOLAR FAMILY
Y. Golovanov Washington NASA 11 Nov. 1974 34 p Transl. into ENGLISH from Novyy Mir (USSR), no. 6, 1974 p 200-220
(Contract NASw-2481)
(NASA-TT-F-14795) Avail: NTIS HC $3.75 CSCL 22C

Background of Soviet and American firsts in space and sketch of scope and history of JPL are presented. Mariner-9 and its results, the question of possible life on Mars, the aborted Voyager, planned Viking and possible joint international manned Mars missions, the Soviet and U.S. Venus missions completed and Mariner-10 Venus Mercury flight, and the Pioneer-10 and -11 Jupiter-Saturn deep space flights are discussed. A brief epilogue refers to the anodized gold letter to the stars attached to Pioneer-10. Author

N75-12014*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
PHASE A CONCEPTUAL DESIGN STUDY OF THE ATMOSPHERIC, MAGNETOSPHERIC AND PLASMAS IN SPACE (AMPS) PAYLOAD
Nov. 1974 450 p refs
(NASA-TM-X-64895) Avail: NTIS HC $11.25 CSCL 22A

The 12 month Phase A Conceptual Design Study of the Atmospheric, Magnetospheric and Plasmas in Space (AMPS) payload performed within the Program Development Directorate of the Marshall Space Flight Center is presented. The AMPS payload makes use of the Spacelab pressurized module and pallet, is launched by the space shuttle, and will have initial flight durations of 7 days. Scientific instruments including particle accelerators, high power transmitters, optical instruments, and chemical release devices are mounted externally on the Spacelab pallet and are controlled by the experimenters from within the pressurized module. The capability of real-time scientist interaction on-orbit with the experiment is a major characteristic of AMPS.
Author

N75-12015*# Battelle Columbus Labs., Ohio.
CHARACTERIZATION OF EXOTHERMIC BRAZING COMPONENTS SKYLAB EXPERIMENT M552
H. E. Pattee and R. E. Monroe Dec. 1973 98 p refs
(Contract NAS8-28725)
(NASA-CR-120518) Avail: NTIS HC $4.75 CSCL 13H

Information developed to characterize flight and ground based samples from the Exothermic Brazing Experiment is detailed. Included is information developed from metallographic observation, chemical analysis, and measurements of component dimensions. Comparisons of the flight and ground based specimens showed that good quality brazes were obtained. Effects of the zero gravity processing were noted on liquid metal flow and braze alloy-base metal reactions. Unusual metallurgical structures exhibited in the nickel brazes made in Skylab were the result of composition variations apparently related to the time-temperature cycle characteristic of this braze. Author

N75-12016*# Little (Arthur D.), Inc., Cambridge, Mass.
M553 SPHERE FORMING EXPERIMENT: PURE NICKEL SPECIMEN EVALUATION
Philip C. Johnson and Edward T. Peters Dec. 1973 47 p
(Contract NAS8-28723)

(NASA-CR-129036) Avail: NTIS HC $3.75 CSCL 13H

A region or cap of very fine two-diminisional surface growth structure was observed at the top of three of the six pure nickel flight specimens. Such two-dimensional surface growth structures have been observed both on the ground-based specimens and on other surface areas of the flight specimens. However, the fine structures observed on the three flight samples are at least an order of magnitude finer than those previously observed, and resemble similar localized, fine, two-dimensional surface structures observed in both ground and flight specimens for the nickel alloys. The two-dimensional growth areas consist primarily of fine equiaxed grains, specimen SL-2.6, fine dendrites, specimen SL-2.5, or a core of fine equiaxed grains surrounded by a ring of fine dendrites, specimen SL-1.9. Author

N75-12017*# Connecticut Univ., Waterbury.

INVESTIGATION OF SOLIDIFICATION IN ZERO-GRAVITY ENVIRONMENT: M553 SPHERE FORMING EXPERIMENT. NICKEL-SILVER ALLOY EVALUATION Contractor Report, May 1972 - Dec. 1973

Theo Z. Kattamis Dec. 1973 22 p refs

(Contract NAS8-28734)

(NASA-CR-129034) Avail: NTIS HC $3.25 CSCL 13H

The processing of nickel-silver alloy specimens in space is discussed. Four specimens were melted only partially, while a fifth was melted completely and assumed after solidification a perfectly spherical shape. Growth of the solid was epitaxial on the unmelted material or on the retaining sting and occurred without undercooling. Solidification was dendritic in all cases with nonequilibrium silver particles forming monotectically between dendrite arms. Substantial loss of silver by evaporation took place. Evaporation of the silver within internal gas cavities on the melt was followed by surface condensation after completion of solidification and cooling, leading to a silver-rich lining in these cavities. The material gave no microstructural evidence of any reduction in liquid convection. Author

N75-12018*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

AN ASSESSMENT OF THE INSTRUMENT POINTING SUBSYSTEMS (IPS) REQUIREMENTS FOR SPACELAB MISSIONS

M. E. Nein and P. D. Nicaise Nov. 1974 45 p

(NASA-TM-X-64896) Avail: NTIS HC $3.75 CSCL 22A

Instrument Pointing Subsystem requirements for Spacelab missions in solar physics, stellar astronomy, and earth observation are analyzed and design guidelines for fine pointing instrument platforms are presented. The requirements for the platforms are time-phased based on NASA projections of flight mission models and payload scheduling. The experiments used for these projections are to be viewed as representative payloads. Other experiments or experiment groupings within any one discipline may be accommodated by an Instrument Pointing Subsystem that meets these requirements. Author

N75-12019*# National Aeronautics and Space Administration, Washington, D.C.

THE FINAL SKYLAB MISSION: MAN AT HOME AND AT WORK IN SPACE

15 Feb. 1974 8 p

(NASA-TM-X-70394; MR-15) Avail: NTIS HC $3.25 CSCL 22C

The accomplishments of the Skylab 4 mission are discussed. The medical experiments and dietary aspects of the mission are reported. The observation of the Comet Kohoutek is described. The remote sensing of earth resources is examined to show the areas of coverage. The repair of the space station and the accomplishment of unscheduled requirements are discussed. Statistical data of all the Skylab missions are tabulated. Author

N75-12020*# Massachusetts Inst. of Tech., Cambridge. Charles Stark Draper Lab.

USER'S GUIDE TO FOUR-BODY AND THREE-BODY TRAJECTORY OPTIMIZATION PROGRAMS

C. L. Pu and T. N. Edelbaum Oct. 1974 227 p

(Contract NAS5-11984)

(NASA-CR-139156) Avail: NTIS HC $7.50 CSCL 22A

A collection of computer programs and subroutines written in FORTRAN to calculate 4-body (sun-earth-moon-space) and 3-body (earth-moon-space) optimal trajectories is presented. The programs incorporate a variable step integration technique and a quadrature formula to correct single step errors. The programs provide capability to solve initial value problem, two point boundary value problem of a transfer from a given initial position to a given final position in fixed time, optimal 2-impulse transfer from an earth parking orbit of given inclination to a given final position and velocity in fixed time and optimal 3-impulse transfer from a given position to a given final position and velocity in fixed time. Author

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

N75-12021# Columbia Univ., New York. Chemical Engineering Research Labs.

INVESTIGATION OF CONVECTIVE ARCS FOR THE SIMULATION OF REENTRY AERODYNAMIC HEATING Final Report, 1 Apr. 1969 - 30 Sep. 1973

C. Sheer, S. Korman, and S. F. Kang 30 Sep. 1973 90 p refs

(Contract F44620-69-C-0104; AF Proj. 9783)

(AD-785388; AFOSR-74-1505TR) Avail: NTIS CSCL 22/2

An experimental program was undertaken to develop an air arc heater for potential use in the simulation of reentry aerodynamic heating. Conceptually the principle of the arc system studied differs from other arc heaters in that the working fluid is injected at or very close to the arc-electrode boundaries while the arc discharge column remains essentially unconfined. The problem areas studied consisted of power scale-up, while maintaining stable and reliable operation, use of uncontaminated air as the working fluid, and achieving a high degree of heat transfer effectiveness by maximizing the penetration of the working fluid into the column of a free-burning arc. (Modified author abstract) GRA

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, mobile transporters; and simulators.

For related information see also *09 Research Support Facilities (Air).*

No abstracts in this category.

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N75-12022*# Chrysler Corp., New Orleans, La. Space Div.

REENTRY AERODYNAMIC CHARACTERISTICS OF A SPACE SHUTTLE SOLID ROCKET BOOSTER MODEL 449 TESTED IN MSFC 14 BY 14 INCH TWT (SA26F)

J. D. Johnson and W. F. Braddock (Northrop Services, Inc., Huntsville, Ala.) Nov. 1974 235 p refs

(Contract NAS9-13247)

(NASA-CR-134435; DMS-DR-2111) Avail: NTIS HC $7.50 CSCL 22B

Force tests of a 0.563 percent scale space shuttle solid rocket booster (SRB) model, MSFC Model 449, were conducted

at the Marshall Space Flight Center 14 x 14 inch Trisonic Wind Tunnel. There were a total of 134 runs (pitch polars) made. Test Mach numbers were 0.6, 0.9, 1.2, 1.96, 2.74, 3.48, 4.00, 4.45, and 4.96; test angles of attack ranged from minus 10 degrees to 190 degrees; test Reynolds numbers ranged from 4.9 million per foot to 7.1 million per foot; and test roll angles were 0, 45, 90, and 135 degrees. The model was tested with three different engine nozzle/skirts. Two of these engine configurations differed from each other in the magnitude of the volume inside the nozzle and skirt. The third engine configuration had part of the nozzle removed. The model was tested with an electrical tunnel in combination with separation rockets of two different heights. Author

N75-12023# Research Inst. of National Defence, Sundbyberg (Sweden).
EXAMINATION OF AN OBJECT FROM SPACE [UNDERSOEKNING AV RYMDFRAGMENT]
Gilbert Larsson Mar. 1973 25 p In SWEDISH
(FOA-1-A-1562-F5) Avail: NTIS HC $3.25

An object found in Jamtland has been examined. The results indicate that it originated in the U.S.S.R. and that the fragment is probably a small rocket unit from a spacecraft. It may have been used either for braking or separation purposes. Author

N75-12024# Lincoln Lab., Mass. Inst. of Tech., Lexington.
VISIBLE MAGNITUDE OF TYPICAL SATELLITES IN SYNCHRONOUS ORBITS
William E. Krag 6 Sep. 1974 40 p refs
(Contract F19628-73-C-0002; AF Proj. 649L)
(AD-785380; TN-1974-23; ESD-TR-74-278) Avail: NTIS CSCL 22/3

Expressions for the visibility, in terms of visible magnitude, of resident space objects are presented in this report. The variations of the visible magnitude with the geometry of the viewing situation, considering variables such as distance, surface type and reflectivity, viewing angles, and spacecraft orientation, are discussed. Calculations of the visible magnitude to be expected and some of the variations are then made for typical satellites in synchronous orbits. Finally, calculations of the maximum visible magnitudes for several satellites, with a collection of the available data and some photographs are presented in an appendix. This work is related to the Telescope Detection and Ranging (TDAR) Program. Author (GRA)

N75-12833 Joint Publications Research Service, Arlington, Va.
OPERATION OF POLISH EQUIPMENT USED ON INTERKOSMOS SPACE SATELLITE DESCRIBED
Jan Hanasz *In its* Transl. on Eastern Europe: Sci. Affairs, no. 440 (JPRS-63573) 3 Dec. 1974 p 1-9 Transl. into ENGLISH from Urania (Warsaw), no. 10, Oct. 1974 p 290-298
(For availability see N75-12832 03-81)

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation*.

No abstracts in this category.

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications*.

N75-12025*# Lockheed Electronics Co., Houston, Tex.
SPACE SHUTTLE ORBITER VEHICLE STAR TRACKER TEST PROGRAM PLAN
R. A. Smith Jul. 1974 29 p
(Contract NAS9-12200)
(NASA-CR-140349; LEC-3805; JSC-09089; IN-74-EG-20) Avail: NTIS HC $3.75 CSCL 17G

The development model test program was written to provide guidance for essential star tracker test support to the Space Shuttle Orbiter Program. The program organization included test equipment preparation, prototype baseline/acceptance tests, prototype total performance tests, and prototype special tests. Test configurations, preparation phase, documentation, scheduling, and manpower requirements are discussed. The test program permits an early evaluation of the tracker's performance prior to completion and testing of the final flight models. J.M.S.

N75-12026*# Hughes Aircraft Co., El Segundo, Calif. Space and Communications Group.
STELLAR TRACKING ATTITUDE REFERENCE SYSTEM Final Report
B. Klestadt Sep. 1974 98 p
(Contract NAS5-21846)
(NASA-CR-139158) Avail: NTIS HC $4.75 CSCL 17G

A satellite precision attitude control system was designed, based on the use of STARS as the principal sensing system. The entire system was analyzed and simulated in detail, considering the nonideal properties of the control and sensing components and realistic spacecraft mass properties. Experimental results were used to improve the star tracker noise model. The results of the simulation indicate that STARS performs in general as predicted in a realistic application and should be a strong contender in most precision earth pointing applications. Author

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support*. For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics*.

N75-12027# Royal Aircraft Establishment, Farnborough (England).
THE ANALYSIS AND DESIGN OF SATELLITE STABILISATION SYSTEMS USING ION PROPULSION
A. Costes, J. C. Laprie, M. Chirouze, and C. Landrault Jun. 1974 23 p refs Transl. into ENGLISH from the French Presented at the LAAS Conf. on Elec. Propulsion in its Space Appl., Toulouse
(RAE-Lib-Trans-1775; BR42365) Avail: NTIS HC $3.25

A method is presented to maximize the technical and economic advantages connected with the use of ion propulsion in communication satellite stabilization systems. Velocity increments and thrust vector magnitudes for orbit corrections are determined. The theoretical study of control laws and the determination of the magnitudes of the corresponding thrust vectors are included. The choice of a stabilization system using ion propulsion is discussed taking account of the technical and economic aspects. Author

N75-12028*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
VIKING MARS LANDER 1975 DYNAMIC TEST MODEL/ORBITER DEVELOPMENTAL TEST MODEL FORCED VIBRATION TEST Summary Report
J. Fortenberry and G. R. Brownlee 1 Aug. 1974 85 p refs
(Contract NAS7-100)
(NASA-CR-140851; JPL-TM-33-689) Avail: NTIS HC $4.75 CSCL 22B

The Viking Mars Lander 1975 dynamic test model and orbiter

developmental test model were subjected to forced vibration sine tests. Flight acceptance (FA) and type approval (TA) test levels were applied to the spacecraft structure in a longitudinal test configuration using a 133,440-N (30,000-lb) force shaker. Testing in the two lateral axes (X, Y) was performed at lower levels using four 667-N (150-lb) force shakers. Forced vibration qualification (TA) test levels were successfully imposed on the spacecraft at frequencies down to 10 Hz. Measured responses showed the same character as analytical predictions, and correlation was reasonably good. Because of control system test tolerances, orbiter primary structure generally did not reach the design load limits attained in earlier static testing. A post-test examination of critical orbiter structure disclosed no apparent damage to the structure as a result of the test environment.
Author

N75-12029*# Chrysler Corp., New Orleans, La. Space Div.
AERODYNAMIC RESULTS OF WIND TUNNEL SEPARATION TESTS ON A 0.01-SCALE MODEL (32-OTS) SPACE SHUTTLE INTEGRATED VEHICLE IN THE AEDC-VKF-SWTA (IA57)
J. J. Daileda (Rockwell Intern. Corp., Downey, Calif.) Nov. 1974 574 p
(Contract NAS9-13247)
(NASA-CR-134401; DMS-DR-2112) Avail: NTIS HC $13.00 CSCL 22B

The integrated space shuttle vehicle was tested to determine proximity force and moment data for the orbiter/external tank and solid rocket booster (SRB) with and without separation rockets firing for both single and dual booster runs. Data were obtained at points t = 0 sec, t = 1.25 sec, and t = 2 sec on the nominal SRB separation trajectory.
Author

N75-12030*# Chrysler Corp., New Orleans, La. Space Div.
SPACE SHUTTLE LAUNCH VEHICLE (13 P-OTS) STRUT SUPPORT INTERFERENCE EFFECTS STUDY IN THE ROCKWELL INTERNATIONAL 7- BY 7-FOOT TRISONIC WIND TUNNEL (IA68)
Robert L. Rogge (Rockwell Intern. Corp., Los Angeles) Nov. 1974 601 p
(Contract NAS9-13247)
(NASA-CR-134427; DMS-DR-2144) Avail: NTIS HC $15.25 CSCL 22B

Strut support interference investigations were conducted on an 0.004-(-) scale representation of the space shuttle launch vehicle in order to determine transonic and supersonic model support interference effects for use in a future exhaust plume effects study. Strut configurations were also tested. Orbiter, external tank, and solid rocket booster pressures were recorded at Mach numbers 0.9, 1.2, 1.5, and 2.0. Angle of attack and angle of sideslip were varied between plus or minus 4 degrees in 2 degree increments. Parametric variations consisted only of the strut configurations.
Author

N75-12031*# Chrysler Corp., New Orleans, La. Space Div.
RESULTS OF INVESTIGATIONS ON AN 0.015-SCALE 140A/B CONFIGURATION OF THE ROCKWELL INTERNATIONAL SPACE SHUTTLE ORBITER (MODEL 49-O) IN THE NASA/AMES RESEARCH CENTER 3.5-FOOT HYPERSONIC WIND TUNNEL (OA36)
Morris D. Milam (Rockwell Intern. Corp., Downey, Calif.), Robert L. Gillins (Rockwell Intern. Corp., Downey, Calif.), and Joseph W. Cleary (NASA. Ames Res. Center) Nov. 1974 300 p
(Contract NAS9-13247)
(NASA-CR-134430; DMS-DR-2162) Avail: NTIS HC $8.75 CSCL 22B

The results of wind tunnel tests of the 140A/B configuration components are reported for the fuselage, canopy, elevons, bodyflaps, pods, engine nozzles, rudder, vertical tail, and wing. The test facility, and data reduction procedures are described. Test results for each component are graphed, and tabulated source data are included.
F.O.S.

N75-12032*# Chrysler Corp., New Orleans, La.
A HYPERSONIC FORCE AND MOMENT TEST OF A 0.006 SCALE MODEL (466) OF THE 330.2 INCH DIAMETER EXTERNAL TANK IN THE AMES RESEARCH CENTER 3.5 FOOT HYPERSONIC WIND TUNNEL (TA9F)
P. E. Ramsey (NASA. Marshall Space Flight Center) and T. C. Davis (Northrop Services, Inc.) Nov. 1974 239 p refs
(Contract NAS9-13247)
(NASA-CR-134425; DMS-DR-2181) Avail: NTIS HC $7.50 CSCL 22B

Data were obtained in a series of wind tunnel tests on the space shuttle external tank over an angle of attack range from 0 deg to 180 deg at Mach numbers of 5.3 and 10.4. Body roll angles varied from 0 deg to 315 deg for the Mach number 10.4 tests. A constant roll angle of 180 deg was used for all Mach number 5.3 tests. The effects of protuberances and Reynolds number on the force and moment coefficients were investigated.
Author

N75-12033*# Chrysler Corp., New Orleans, La. Space Div.
RESULTS OF AN EXPERIMENTAL AERODYNAMIC INVESTIGATION TO OBTAIN STATIC STABILITY AND CONTROL CHARACTERISTICS OF THE SSV CONFIGURATIONS: THE 2A(VL70-000089B) MODEL 1 AND 3(VL70-000139B) MODEL 2 ORBITER AT MACH NUMBERS OF 2.5, 3.9 AND 4.6 IN THE NASA LaRC 4 X 4-FOOT UPWT (OA44)
V. Esparza (Rockwell Intern. Corp., Downey, Calif.) and M. D. Milam (Rockwell Intern. Corp., Downey, Calif.) Nov. 1974 579 p
(Contract NAS9-13247)
(NASA-CR-134411; DMS-DR-2057) Avail: NTIS HC $13.25 CSCL 22B

Investigation of space shuttle orbiter configurations 2A(VL70-000089B) and 3(VL70-000139B) was performed at the Langley Research Center Unitary Plan Wind Tunnel (UPWT) from June 1, 1973, to June 15, 1973, for 60 test hours. The primary test objectives were to obtain stability and control characteristics for Configurations 2A and 3 and an alternate forebody used with Configuration 3. In addition, hinge moments were measured on the elevons and rudder for Configuration 2A only. The configurations were tested at Mach numbers 2.5, 3.9 and 4.6. Pitch runs were made at angles of attack from -4 to 44 deg and sideslip angles from -4 to +6. Static pressures were measured at the fuselage base for use in force data correction.
Author

N75-12034*# Chrysler Corp., New Orleans, La. Space Div.
EFFECTS OF AIR BREATHING ENGINE PLUMES ON SSV ORBITER SUBSONIC WING PRESSURE DISTRIBUTION (OA57B), VOLUME 1
T. Soard (Rockwell Intern. Corp., Los Angeles) Oct. 1974 552 p 2 Vol.
(Contract NAS9-13247)
(NASA-CR-134416; DMS-DR-2080-Vol-1) Avail: NTIS HC $13.00 CSCL 22B

Data were obtained during wind tunnel tests of a 0.0405-scale model of the ferry configuration of the space shuttle vehicle orbiter conducted in a low speed wind tunnel during the time period of September 18 to September 23, 1973. The primary test objective was to investigate orbiter wing pressure distributions resulting from nacelle plumes above and below the wing. Three six-engine nacelle configurations were tested. One configuration had a twin-podded nacelle mounted above each wing and the others had one mounted below each wing. Both had a centerline twin-podded nacelle mounted below the wing. Wing pressure distribution was determined by locating static pressure bugs on the upper and lower surfaces of the left wing. Pressure bugs were also located on the upper and lower surfaces of the body flap and on the B12 afterbody fairing when it was installed. Base and balance cavity pressures were recorded and a strain gage instrumented beam in the right wing measured elevon hinge moments and normal forces.
Author

N75-12035*# Chrysler Corp., New Orleans, La. Space Div.
EFFECTS OF WING/ELEVON GAP SEALING FLAPPER DOORS ON ORBITER ELEVON EFFECTIVENESS OF MODEL 16-0 IN THE NAAL 7.75 BY 11 FOOT CONTINUOUS FLOW WIND TUNNEL (OA119A)
R. Mennell (Rockwell Intern., Los Angeles) Oct. 1974 288 p
(Contract NAS9-13247)
(NASA-CR-134421; DMS-DR-2187) Avail: NTIS HC $8.75 CSCL 22B

Space shuttle orbiter elevon effectiveness was measured with the 6 inch elevon/elevon and elevon/fuselage gaps and various

configurations of wing/elevon upper hingeline gap sealing flapper doors. The elevon configuration parametric variations consisted of sealing the lower hingeline to prevent flow-through and testing a long chord flapper door, a short chord flapper door, no flapper door (elevon/wing gap upper hingeline completely open), and a completely sealed elevon at elevon deflections from +20 deg to -40 deg. Preliminary data analysis indicates loss of elevon effectiveness at deflections more negative than -20 deg, and little or no effect of flapper door configuration on elevon effectiveness. Flow visualization photographs taken at alpha = 15 deg for two flapper door configurations substantiated the force data results. Aerodynamic force and moment data were measured in the body axis by a 2.5 inch task type internal strain gage balance. The model was sting supported through the base region with a nominal angle of attack range of -10 deg less than or equal to alpha less than or equal to 24 deg at a model angle of sideslip of Beta equal to 0 deg. Author

N75-12036*# Essex Corp., Alexandria, Va.
STUDY OF ROLES OF REMOTE MANIPULATOR SYSTEMS AND EVA FOR SHUTTLE MISSION SUPPORT, VOLUME 1
Thomas B. Malone and Angelo J. Micocci Oct. 1974 132 p refs
(Contract NAS9-13710)
(NASA-CR-140364) Avail: NTIS HC $5.75 CSCL 22B

Alternate extravehicular activity (EVA) and remote manipulator system (RMS) configurations were examined for their relative effectiveness in performing an array of representative shuttle and payload support tasks. Initially a comprehensive analysis was performed of payload and shuttle support missions required to be conducted exterior to a pressurized inclosure. A set of task selection criteria was established, and study tasks were identified. The EVA and RMS modes were evaluated according to their applicability for each task and task condition. The results are summarized in tabular form, showing the modes which are chosen as most effective or as feasible for each task/condition. Conclusions concerning the requirements and recommendations for each mode are presented. Author

N75-12037*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SKYLAB MISSION PLANNING SUPPORT THROUGH THE USE OF A HYBRID SIMULATION
M. W. Hammer and D. O. McNiel Oct. 1974 32 p refs
(NASA-TM-X-64889) Avail: NTIS HC $3.75 CSCL 22B

The manner in which a hybrid simulation was used in support of Skylab operations in the area of dynamics and control is described. Simulation results were used in the development of acceptable vehicle maneuvers and in the verification of acceptability when the maneuvers were integrated into daily flight plans. The criterion of acceptability was based on vehicle controllability and the minimization of thruster system propellant usage. A simulation of a representative daily flight plan containing three experimental maneuvers is included, along with thruster attitude control system propellant usage tables which show predicted and actual usage for each mission. The inherent characteristics of quick turnaround and flexibility afforded by the hybrid computer proved invaluable in the operations support required throughout the Skylab mission. Author

N75-12038*# Massachusetts Inst. of Tech., Cambridge. The Charles Stark Draper Lab.
DESIGN OF THE SOFTWARE DEVELOPMENT AND VERIFICATION SYSTEM (SWDVS) FOR SHUTTLE NASA STUDY TASK 35
Lance W. Drane, Bruce J. McCoy, and Leonard W. Silver Aug. 1973 151 p refs
(Contract NAS9-4065; DSR Proj. 55-23890)
(NASA-CR-140341; R-721) Avail: NTIS HC $6.25 CSCL 22B

An overview of the Software Development and Verification System (SWDVS) for the space shuttle is presented. The design considerations, goals, assumptions, and major features of the design are examined. A scenario that shows three persons involved in flight software development using the SWDVS in response to a program change request is developed. The SWDVS is described from the standpoint of different groups of people with different responsibilities in the shuttle program to show the functional requirements that influenced the SWDVS design. The software elements of the SWDVS that satisfy the requirements of the different groups are identified. Author

N75-12039*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE SAS-D NUTATION CONTROL SYSTEM
Javin M. Taylor Jun. 1972 26 p refs
(NASA-TM-X-65944; X-732-72-196) Avail: NTIS HC $3.75 CSCL 22B

A control law is developed for the SAS-D nutation control system. Nutation is removed in a sub-optimal manner with respect to fuel consumed, but attitude errors are minimized. The research performed consist of an investigation of nutation theory and nutation due to energy dissipation, nutation detection analysis, nutation control analysis, and error analysis. The resulting nutation control system uses an accelerometer or rate gyro to sense the nutation angle theta which varies sinusoidally at the nutation frequency omega. The sensed nutation angle is compared with a threshold theta sub tau. If the sensed nutation is greater, a thrust pulse of duration equal to the period of one spin cycle is initiated. Since the threshold theta sub tau is set equal to the amount of nutation that can be removed by one thrust pulse of duration equal to one spin cycle, the spacecraft nutation is reduced to near zero. Error analysis indicates that the nutation sensed, the threshold, the amount of nutation that can be removed during one thrust pulse, and the time duration of one thrust pulse are all sensitive to the spacecraft spin frequency imparted by the Delta rocket. Thus, the nutation control system was designed to be adptive to the possible variations in imparted spin frequency. Author

N75-12040*# Chrysler Corp., New Orleans, La. Space Div.
EFFECTS OF THE AIR BREATHING ENGINE PLUMES ON SSV ORBITER SUBSONIC WING PRESSURE DISTRIBUTIONS (OA57A)
Bruce W. Cameron, Jr. (Rockwell Intern., Los Angeles) Oct. 1974 706 p
(Contract NAS9-13247)
(NASA-CR-134414; DMS-DR-2074) Avail: NTIS HC $17.25 CSCL 22B

Experimental aerodynamic pressure investigations were conducted on a 0.0405 scale representation of the -89 space shuttle orbiter ferry configuration in the Rockwell International 7.75 x 11.00 foot Low Speed Wind Tunnel. The primary test objective was to investigate the orbiter wing pressure distribution resulting from five under-wing engine nacelle plumes. Two five engine nacelle configurations were tested at 3 ground plane heights with pressure bug measurements being made on the left upper and lower wing panel. In addition, base and balance cavity pressure measurements were made, with elevon normal and hinge moment measurements on the right panel. Author

N75-12041# Societe Nationale Industrielle Aerospatiale, Paris (France). Div. des Systemes Balistiques et Spatiaux.
DESIGN AND DEVELOPMENT OF A MOMENTUM WHEEL WITH A MAINLY PASSIVE MAGNETIC BEARING, PHASE 1. VOLUME 2: ANNEXES
31 May 1974 294 p Partly in ENGLISH and partly in FRENCH
(Contract ESTEC-2038/73-PP)
(ESRO-CR(P)-506) Avail: NTIS HC $8.75

Problems relating to the design and development of a momentum wheel with magnetic bearings are examined. Magnetic suspension losses by eddy currents were calculated. Axial and radial stiffness were measured and computed. Elementary viscous piston dampers were investigated along with damping factors of configurations based on Foucault current. The dynamics of a system for satellite despinning using a momentum wheel were studied. Test results of an electrodynamic velocity sensor for axial displacement are described. For individual titles, see N75-12042 through N75-12053.

N75-12042 Societe Nationale Industrielle Aerospatiale, Paris (France). Div. des Systemes Balistiques et Spatiaux.
MOMENTUM WHEEL - MAGNETIC SUSPENSION LOSSES BY EDDY CURRENTS
In its Design and Develop. of a Momentum Wheel with a Mainly

Passive Magnetic Bearing, Phase 1, Vol. 2 31 May 1974 5 p (For availability see N75-12041 03-18)

Eddy current losses, resulting from the use of a discontinuous samarium cobalt magnet in a magnetic momentum wheel suspension system, were calculated. Since it was not possible to obtain samarium cobalt parts large enough, the rings of magnets were made up of a certain number of adjacent $SmCo_5$ blocks. The induction in the air gaps will not be constant. It is shown that by sorting the magnets and using sheets for smoothing the magnetic flux, an induction variation can be obtained not greater than plus or minus .10 Gauss from one magnet to another, and plus or minus 100 Gauss between the lower and upper value, but at a frequency of 133 Hz (1 turn) instead of 2.666 Hz (block to block). These values permit maintaining the eddy current losses within the limits prescribed, i.e. 0.5 watt for the bearings and 0.5 watt for the damping system. ESRO

N75-12043 Societe Nationale Industrielle Aerospatiale, Paris (France). Div. des Systemes Balistiques et Spatiaux.
MEASUREMENT OF AXIAL AND RADIAL STIFFNESS [MESURES DES RIGIDITES AXIALES ET RADIALES] c37
In its Design and Develop. of a Momentum Wheel with a Mainly Passive Magnetic Bearing, Phase 1, Vol. 2 31 May 1974 22 p In FRENCH (For availability see N75-12041 03-18)

The radial and axial relationships between the distance in position with respect to the equilibrium and the magnetic force were measured for magnetic bearing configurations of a reaction wheel. A test mounting allowed these measurements to be performed using linear magnetic circuit elements. Tests were carried out on two configurations, one with axial magnet polarization, the other with radial polarization. Best results with respect to axial/radial stiffness were obtained for radial magnet polarization. ESRO

N75-12044 Societe Nationale Industrielle Aerospatiale, Paris (France). Div. des Systemes Balistiques et Spatiaux.
RATIO OF AXIAL AND RADIAL STIFFNESS IN AN AXISYMMETRIC MAGNETIC BEARING [RAPPORT DES RAIDEURS AXIALE ET RADIALE DANS UN PALIER MAGNETIQUE A SYMETRIE DE REVOLUTION] c35
In its Design and Develop. of a Momentum Wheel with a Mainly Passive Magnetic Bearing, Phase 1, Vol. 2 31 May 1974 10 p In FRENCH (For availability see N75-12041 03-18)

The ratio of axial and radial stiffness was calculated for a magnetic bearing. Formulas were derived for the axial and radial stiffness as functions of magnetic surface mass and second order differentials of the magnetic potential, leading to a formula for the stiffness ratio with the radial magnetic field strength as a parameter. If the rotor charge is positive, the ratio is found to be greater than or equal to 2. ESRO

N75-12045 Societe Nationale Industrielle Aerospatiale, Paris (France). Div. des Systemes Balistiques et Spatiaux.
STUDY OF REPULSION BEARINGS c37
In its Design and Develop. of a Momentum Wheel with a Mainly Passive Magnetic Bearing, Phase 1, Vol. 2 31 May 1974 4 p (For availability see N75-12041 03-18)

Radial and axial stiffness of magnetic repulsion bearings were calculated and measured, and their ratio determined. The formula for radial stiffness was taken from literature. The ratio of axial and radial stiffness was found to be 2.556, which is in agreement with theoretical values. ESRO

N75-12046 Societe Nationale Industrielle Aerospatiale, Paris (France). Div. des Systemes Balistiques et Spatiaux.
CALCULATIONS ON AN ELEMENTARY FLUID DAMPER c37
In its Design and Develop. of a Momentum Wheel with a Mainly Passive Magnetic Bearing, Phase 1, Vol. 2 31 May 1974 6 p (For availability see N75-12041 03-18)

Elementary viscous piston dampers were investigated. Several outside diameters and several lengths of hole were considered. Calculations were made at ambient temperature for several types of viscous liquids. Best results were obtained for silicone oils. ESRO

N75-12047 Societe Nationale Industrielle Aerospatiale, Paris (France). Div. des Systemes Balistiques et Spatiaux.
FOUCAULT CURRENT DAMPING TESTS [ESSAIS RELATIFS AUX SYSTEMES D'AMORTISSEMENT PAR COURANTS DE FOUCAULT] c70
In its Design and Develop. of a Momentum Wheel with a Mainly Passive Magnetic Bearing, Phase 1, Vol. 2 31 May 1974 13 p In FRENCH (For availability see N75-12041 03-18)

Calculations were carried out on a passive system: a spring-suspended copper plate between two magnets, a semi-active system with coiled wires, and a system with elastomeric coupling. ESRO

N75-12048 Societe Nationale Industrielle Aerospatiale, Paris (France). Div. des Systemes Balistiques et Spatiaux.
THEORETICAL STUDY OF SYSTEM DYNAMICS c37
In its Design and Develop. of a Momentum Wheel with a Mainly Passive Magnetic Bearing, Phase 1, Vol. 2 31 May 1974 79 p (For availability see N75-12041 03-18)

The dynamics of a system for satellite despinning using a momentum wheel were investigated. The conditions of utilization, as well as the external and internal constraints, were analyzed. The dynamics of the gyroscopic motion are discussed, taking into account the static and dynamic imbalance due to geometric imperfections in the wheel. Optimization of the suspension characteristics is considered. A general study of the axial servomechanism is presented. Simulation curves show in particular that when the wheel is not submitted to any external disturbance, the effect of static and dynamic imbalances produces a rotation of the rotor axis around the fixed axis of the bearings. ESRO

N75-12049 Societe Nationale Industrielle Aerospatiale, Paris (France). Div. des Systemes Balistiques et Spatiaux.
TESTS ON AXIAL VELOCITY SENSOR [ESSAIS D'UN CAPTEUR DE VITESSE AXIALE] c70
In its Design and Develop. of a Momentum Wheel with a Mainly Passive Magnetic Bearing, Phase 1, Vol. 2 31 May 1974 4 p In FRENCH (For availability see N75-12041 03-18)

Test results of an electrodynamic velocity sensor for axial displacement are described. The working principle is similar to that of an electrodynamic loudspeaker, but here the coil is fixed and the magnetic circuit fixed on the axis of rotation. Rotation induces no current in the coil, but axial displacement creates an EMF which is proportional to the axial velocity. ESRO

N75-12050 Societe Nationale Industrielle Aerospatiale, Paris (France). Div. des Systemes Balistiques et Spatiaux.
PRINCIPLE OF SYSTEMS WITH FOUCAULT CURRENT DISSIPATION [PRINCIPE DES SYSTEMES A DISSIPATION PAR COURANTS DE FOUCAULT] c37
In its Design and Develop. of a Momentum Wheel with a Mainly Passive Magnetic Bearing, Phase 1, Vol. 2 31 May 1974 6 p In FRENCH (For availability see N75-12041 03-18)

A magnetic bearing study was carried out to determine the damping effects of Foucault currents, based on copper disks. If the copper disk is attached to the rotor, no energy will be dissipated. If the magnets are linked to the rotor, and the stator carries the copper, energy will be dissipated. To obtain damping, it is necessary to link the magnets to the rotor and the copper to the stator. ESRO

N75-12051 Societe Nationale Industrielle Aerospatiale, Paris (France). Div. des Systemes Balistiques et Spatiaux.
TEST APPARATUS FOR MOTOR AND MAGNETIC BEARING c37
In its Design and Develop. of a Momentum Wheel with a Mainly Passive Magnetic Bearing, Phase 1, Vol. 2 31 May 1974 22 p (For availability see N75-12041 03-18)

Experimental equipment, used mainly for measuring losses of magnetic bearings, is described. The equipment allows measurement of the efficiency of a type 2 motor, rotation losses of a magnetic bearing, and radial stiffness. ESRO

N75-12052 Societe Nationale Industrielle Aerospatiale, Paris (France). Div. des Systemes Balistiques et Spatiaux.
COMMAND ELECTRONICS OF THE INERTIA WHEEL [ELECTRONIQUE DE COMMANDE DE LA ROUE A INERTIE] c33

In its Design and Develop. of a Momentum Wheel with a Mainly Passive Magnetic Bearing, Phase 1, Vol. 2 31 May 1974 85 p In FRENCH (For availability see N75-12041 03-18)

Possible solutions for electronic control equipment of the inertia wheel were studied. Functions to be carried out by this equipment are rotation command, axial control, damping, and power supply. An evaluation model, based on the criteria of reliability, minimum volume, and low power consumption, was developed. ESRO

N75-12053 Societe Nationale Industrielle Aerospatiale, Paris (France). Div. des Systemes Balistiques et Spatiaux.
STUDY OF THE AXIAL ACTUATOR **c37**
In its Design and Develop. of a Momentum Wheel with a Mainly Passive Magnetic Bearing, Phase 1, Vol. 2 31 May 1974 16 p (For availability see N75-12041 03-18)

A magnetic bearing with passive radial centering, the axial position of which is controlled by an electronic servo control system with low power consumption, was investigated. The characteristics of a double magnetic bearing model for experimental purposes were summarized. The magnet was Ticonal 1500, but samarium cobalt should improve performance. Results show that, with two teeth on the polar pieces at the level of the gap, the radial stiffness goes up to 3.2 daN/mm and the axial stiffness goes down to 20 daN/mm for each of the two bearings. ESRO

N75-12054# Raytheon Co., Bedford, Mass. Missile Systems Div.
MODULAR DIGITAL MISSILE GUIDANCE SYSTEM STUDY Final Report, 1 Nov. 1973 - 30 Apr. 1974
Bruce A. Hall and Walter V. Tainor 30 Jun. 1974 347 p refs
(Contract N00014-74-C-0056)
(AD-784969; BR8073) Avail: NTIS CSCL 19/5

This report addresses the feasibility and application of modular digital computers for the guidance function for several classes of air to air missile. Functional requirements, design techniques and algorithms for performing sensor track and stabilization, filtering and estimation, guidance and vehicle control are defined. The requirements imposed upon a digital implementation are determined in terms of throughput, memory and architecture. Author (GRA)

N75-12055# Dayton Univ., Ohio.
AN ARC IMAGING FURNACE FOR THE CHARACTERIZATION OF THERMALLY PROTECTIVE MATERIALS Final Report
D. E. Earley Jun. 1974 32 p refs
(Contract F33615-72-C-1610; AF Proj. 7340)
(AD-785586; AFML-TR-74-128) Avail: NTIS CSCL 13/1

An ADL-Strong arc imaging furnace was modified for ablation investigations of protection materials in thermal radiation environments. Radiances up to 180 cal/sq cm-sec were generated over an irradiance zone of 9 mm diameter. Proportionately lower fluxes were also obtained over larger zones, e.g., up to 254 mm in diameter. Significant improvements were made in irradiance exposure times through the use of solid state timing and control device involving automatic sequencing at both the shutter and dowser. The modified arc image furnace was also shown to be useful for investigating materials in contamination-free environments involving vacuum, air or inert gas. The arc imaging furnace was demonstrated to be a versatile tool for research on thermal protection materials, such as fire protection fabrics and coatings, thermal flash resistant coatings, heat resistant paints, ablators, and for the study of crystalline materials at high heating ratings. (Modified author abstract) GRA

N75-12056# Douglas Aircraft Co., Inc., Long Beach, Calif.
THE MARK 4 SUPERSONIC-HYPERSONIC ARBITRARY BODY PROGRAM. VOLUME 1: USER'S MANUAL Final Report
Arvel E. Gentry, Douglas N. Smyth, and Wayne R. Oliver Nov. 1973 270 p refs
(Contract F33615-72-C-1675)
(AD-778443; AFFDL-TR-73-159-Vol-1) Avail: NTIS CSCL 22/3

The report describes a digital computer program system that is capable of calculating the supersonic and hypersonic aerodynamic characteristics of complex arbitrary three-dimensional shapes. This program is identified as the Mark IV Supersonic-Hypersonic Arbitrary-Body Computer Program. This program is a complete reorganization and expansion of the old Mark III Hypersonic Arbitrary-Body Program. The Mark IV program has a number of new capabilities that extend its applicability down into the supersonic speed range. (Modified author abstract) GRA

N75-12057# Douglas Aircraft Co., Inc., Long Beach, Calif.
THE MARK 4 SUPERSONIC-HYPERSONIC ARBITRARY BODY PROGRAM. VOLUME 3: PROGRAM LISTINGS Final Report
Arvel E. Gentry, Douglas N. Smyth, and Wayne R. Oliver Nov. 1973 583 p
(Contract F33615-72-C-1675)
(AD-778445; AFFDL-TR-73-159-Vol-3) Avail: NTIS CSCL 22/3

The volume contains the source language listings of the Mark IV Supersonic-Hypersonic Arbitrary-Body Program (Mod 0 Version). The program as shown in this listing will operate on CDC 6500, 6600, and CYBER 74 computers. With a small converter program, the Mark IV program can be converted for operation on IBM 360 and 370 types of computers. This converter program is included with the listings. GRA

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography*.

No abstracts in this category.

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion*, *28 Propellants and Fuels*, and *44 Energy Production and Conversion*.

N75-12058*# Bell Aerospace Co., Buffalo, N.Y.
NONDESTRUCTIVE TESTS OF REGENERATIVE CHAMBERS Final Report
G. A. Malone, L. Vecchies, and R. Wood Jun. 1974 100 p
(Contract NAS3-16800)
(NASA-CR-134656; BAC-8654-953005) Avail: NTIS HC $4.75 CSCL 21H

The capabilities and limitations of nondestructive evaluation methods were studied to detect and locate bond deficiencies in regeneratively cooled thrust chambers for rocket engines. Flat test panels and a cylinder were produced to simulate regeneratively cooled thrust chamber walls. Planned defects with various bond integrities were produced in the panels to evaluate the sensitivity, accuracy, and limitations of nondestructive methods to define and locate bond anomalies. Holography, acoustic emission, and ultrasonic scan were found to yield sufficient data to discern bond quality when used in combination and in selected sequences. Bonding techniques included electroforming and brazing. Materials of construction included electroformed nickel bonded to Nickel 200 and OFHC copper, electroformed copper bonded to OFHC copper, and 300 series stainless steel brazed to OFHC copper. Variations in outer wall strength, wall thickness, and defect size were evaluated for nondestructive test response. Author

N75-12059*# Bell Aerospace Co., Buffalo, N.Y.
NONDESTRUCTIVE TESTS OF REGENERATIVE CHAMBERS, APPENDIX Final Report

G. A. Malone, L. Vecchies, and R. Wood Jun. 1974 196 p (Contract NAS3-16800)
(NASA-CR-134657; BAC-8654-953005-App) Avail: NTIS HC $7.00 CSCL 21H
For abstract, see N75-12058.

N75-12060*# Princeton Univ., N.J. Dept. of Aerospace and Mechanical Sciences.
INVESTIGATION OF THE STARTING TRANSIENTS OF HIGH PERFORMANCE SOLID-PROPELLANT MOTORS Final Report, 1 Oct. 1967 - 30 Sep. 1974
Martin Summerfield and Leonard H. Caveny Oct. 1974 12 p (Grant NGR-31-001-109)
(NASA-CR-140800) Avail: NTIS HC $3.25 CSCL 21H

The starting transients of solid propellant engines were investigated to develop design principles for predicting transients in high performance igniter and engine configurations. Research and diagnosis were conducted on the processes affecting ignition transients, such as heat flux, igniter, flame spreading over the surface, and nonsteady combustion gas dynamics. Abstracts of published reports related to this research are presented. Topics discussed include: development of an analytical model, analytical prediction of the entire ignition transient, transient behavior of pressure and regression rate during reignition after shut-down, and problems associated with restarting hybrid rocket engines.
F.O.S.

N75-12061*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
STATUS OF FLOW SEPARATION PREDICTION IN LIQUID PROPELLANT ROCKET NOZZLES
Robert H. Schmucker Nov. 1974 69 p refs
(NASA-TM-X-64890) Avail: NTIS HC $4.25 CSCL 21H

Flow separation which plays an important role in the design of a rocket engine nozzle is discussed. For a given ambient pressure, the condition of no flow separation limits the area ratio and, therefore, the vacuum performance. Avoidance of performance loss due to area ratio limitation requires a correct prediction of the flow separation conditions. To provide a better understanding of the flow separation process, the principal behavior of flow separation in a supersonic overexpanded rocket nozzle is described. The hot firing separation tests from various sources are summarized, and the applicability and accuracy of the measurements are described. A comparison of the different data points allows an evaluation of the parameters that affect flow separation. The pertinent flow separation predicting methods, which are divided into theoretical and empirical correlations, are summarized and the numerical results are compared with the experimental points.
Author

N75-12062# Royal Aircraft Establishment, Farnborough (England).
HIGH VOLTAGE SUPPLIES FOR ELECTRIC THRUSTERS
A. Monier May 1974 13 p Transl. into ENGLISH from the French Presented at the LAAS Conf. on Elec. Propulsion in its Space Appl., Toulouse
(RAE-Lib-Trans-1773; BR42314) Avail: NTIS HC $3.25

The characteristics of the high voltage supplies required for 0.5 to 3mN thrust contact ionization cesium thrusters are discussed. A 1300V, 4mA supply whose characteristics are perfectly amenable to this use is described, the means of increasing the output power of this supply are analyzed.
Author

N75-12063*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
A METHOD FOR DETERMINING OPTIMUM PHASING OF A MULTIPHASE PROPULSION SYSTEM FOR A SINGLE-STAGE VEHICLE WITH LINEARIZED INERT WEIGHT
James A. Martin Washington Nov. 1974 26 p refs
(NASA-TN-D-7792; L-9731) Avail: NTIS HC $3.75 CSCL 21H

A general analytical treatment is presented of a single-stage vehicle with multiple propulsion phases. A closed-form solution for the cost and for the performance and a derivation of the optimal phasing of the propulsion are included. Linearized variations in the inert weight elements are included, and the function to be minimized can be selected. The derivation of optimal phasing results in a set of nonlinear algebraic equations for optimal fuel volumes, for which a solution method is outlined. Three specific example cases are analyzed: minimum gross lift-off weight, minimum inert weight, and a minimized general function for a two-phase vehicle. The results for the two-phase vehicle are applied to the dual-fuel rocket. Comparisons with single-fuel vehicles indicate that dual-fuel vehicles can have lower inert weight either by development of a dual-fuel engine or by parallel burning of separate engines from lift-off.
Author

N75-12064*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
POWER PROCESSOR DESIGN CONSIDERATIONS FOR A SOLAR ELECTRIC PROPULSION SPACECRAFT
E. N. Costogue and J. A. Gardner 30 Jun. 1974 67 p refs (Contract NAS7-100)
(NASA-CR-140842; JPL-TM-33-705) Avail: NTIS HC $4.25 CSCL 21C

Propulsion power processor design options are described. The propulsion power processor generated the regulated dc voltages and currents from a solar array source of a solar electric propelled spacecraft. The power processor consisted of 12 power supplies that provide the regulated voltages and currents necessary to power a 30-cm mercury ion thruster. The design options for processing unregulated solar array power and for generating the regulated power required by each supply are studied. The technical approaches utilized in the developed design and the technological limitation of the identified design options are discussed. Alternate approaches for delivering power to a number of mercury ion thrusters and methods of optimizing are described. It was concluded that this power processor design should be considered for application in solar electric propulsion missions of the future.
Author

N75-12065# Lockheed Missiles and Space Co., Palo Alto, Calif.
ELECTROJET POWER PLANTS IN SPACE
I. M. Andronov, Iu. P. Rylov, Iu. F. Tainov, and Iu. V. Trifonov 30 Jan. 1974 5 p refs Transl. into ENGLISH from Kosmich. Issled., Akad. Nauk SSSR (Moscow), v. 12, no. 3, 1974 p 447-450
Avail: NTIS HC $3.25; National Translation Center, John Crerar Library, Chicago, Ill. 60616

The thrust impulse for electric jet power plants for artificial earth satellite correction and orientation systems are analyzed. The initial correction and station-keeping of a geostationary and heliosynchronous AES are considered. The root-mean-square value of the thrust impulse is not more than 1.7 T.sec per ton of vehicle mass for the operations mentioned. It is shown that using an electric jet motor in orientation systems is expedient for orbits with altitudes on the order of 2 - 3 earth radii. The stationary plasma motor tested on the meteor is considered one of the most efficient for the solution of the problems considered.
Author

N75-12066# Lockheed Missiles and Space Co., Palo Alto, Calif.
DEVELOPMENT OF A STATIONARY PLASMA MOTOR (SPM) AND ITS TESTING ON THE METEOR
L. A. Artsimovich, I. M. Andronov, Iu. V. Esipchuk, I. A. Barsukov, K. N. Kozubskii, Iu. M. Levchenko, V. A. Mikhailichenko, A. I. Morozov, E. M. Petrov, and M. K. Romanovskii 14 Aug. 1973 22 p refs Transl. into ENGLISH from Kosmich. Issled., Akad. Nauk SSSR (Moscow), v.12, no. 3, 1974 p 451-468
Avail: NTIS HC $3.25; National Translation Center, John Crerar Library, Chicago, Ill. 60616

Development and flight testing of an experimental correcting motor (CPP) with stationary plasma motors (SPM) on the "Meteor" satellite are presented. The experiment demonstrated the compability of the CPP with SPM under space conditions and the capatibility of CPP functioning with the satellite systems, including stable radio communications between the vehicle and earth. Telemetry information from the satellite permitted a accurate and complete representation to be obtained about the CPP operation under space conditions. All the characteristics of the CPP operating in space corresponded to results obtained in ground tests. The space experiment permitted verification of the possibilities and prospects of using SPM as actuators of orbit orientation and correction systems for artificial earth satellites.
Author

N75-12067# Royal Aircraft Establishment, Farnborough (England).
THE CONCEPTION AND REALISATION OF SUB-ASSEMBLIES FOR THE TEMPERATURE CONTROL OF A MICROTHRUSTER. OPTIMISATION BY DEVELOPMENT OF A MATHEMATICAL MODEL
C. Landrault and M. Briot May 1974 19 p refs Transl. into ENGLISH from the French Presented at the LAAS Conf. on Elec. Propulsion in its Space Appl., Toulouse, 1972
(RAE-Lib-Trans-1757; BR42248) Avail: NTIS HC $3.25

This paper treats two complementary subjects: (1) A theoretical study is made of a cesium contact ion type of microthruster considered as a multivariable system. A digital program is set up taking into account the thus determined transfer functions. (2) The results obtained are applied to the design of the beam current regulation loop using as a control the temperature of the vaporizer. The realization and the digital simulation of the subset are explained. Author

N75-12068# Research Inst. of National Defence, Sundbyberg (Sweden).
CONTROL UNIT FOR THE CONTROL SYSTEM OF A ROCKET WITH LIQUID TYPE ENGINE [STYRENHET TILL REGLERSYSTEM FOER VAETSKERAKETMOTOR]
Bjorn Skoeldstroem and R. Eliasson Oct. 1972 21 p In SWEDISH
(FOA-1-C-1471-D3) Avail: NTIS HC $3.25

A brief description of the construction and employment of an electronic control unit is given. The unit is part of a system for controlling engine pressure and mixture proportions in a liquid type engine. The report also contains diagrams of the electrical circuit and a photograph of the unit. Author

N75-12069*# Rocketdyne, Canoga Park, Calif.
SPACE SHUTTLE MANEUVERING ENGINE REUSABLE THRUST CHAMBER PROGRAM. TASK 11: LOW EPSILON STABILITY TEST REPORT DATA DUMP
R. P. Pauckert [1974] 42 p
(Contract NAS9-12802)
(NASA-CR-140358; ASR-74-302) Avail: NTIS HC $3.75 CSCL 21I

The stability characteristics of the like-doublet injector were defined over the range of OME chamber pressures and mixture ratios. This was accomplished by bomb testing the injector and cavity configurations in solid wall thrust chamber hardware typical of a flight contour with fuel heated to regenerative chamber outlet temperatures. It was found that stability in the 2600-2800 Hz region depends upon injector hydraulics and on chamber acoustics. N.R.

N75-12070*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EFFECT OF OXYGEN ADDITION ON ALTITUDE BLOWOUT AND RELIGHT OF AN EXPERIMENTAL COMBUSTOR SEGMENT
Carl T. Norgren and Robert D. Ingebo Washington Dec. 1974 13 p refs
(NASA-TM-X-3154; E-8066) Avail: NTIS HC $3.25 CSCL 21H

The effect of oxygen addition on the low pressure altitude blowout limits of an experimental combustor segment was investigated. Data were obtained for two inlet-air temperatures, two inlet-airflow rates, and a constant fuel-air ratio of 0.020 with Jet A fuel. It was shown that the pressure at blowout could be reduced to correspond to an increase in altitude of 4.6 kilometers with oxygen flow rates of 8 to 16 percent by weight of the total fuel flow. Author

N75-12071# United Technology Center, Sunnyvale, Calif.
HIGH CHAMBER PRESSURE BLAST TUBE AND NOZZLE MATERIAL EVALUATION, VOLUME 1 Final Report, Apr. 1971 - Jul. 1973
Wendell A. Stephen 17 Jun. 1974 171 p refs
(Contract F04611-71-C-0051; AF Proj. 3059)
(AD-780531/0; UTC-2410-FR-Vol-1; AFRPL-TR-73-60-Vol-1) Avail: NTIS HC $6.25 CSCL 21/8

The effects of propellant corrosivity and blast tube contraction ratio were evaluated on candidate nozzle materials in high chamber pressure rocket motor environments (3,000 and 3,500 psia). A total of 16 lightweight aft closures and nozzles were designed, fabricated, and test fired. High velocity blast tubes with contraction ratios of 2.0 and 1.3, respectively, were used on all nozzles. The effects of propellant flame temperature and corrosivity were evaluated by testing with both 18% and 5% aluminized, 88% solids loaded CTPB propellants. The effects of both cylindrical and keyhole port grain configurations also were evaluated. Conventional state-of-the-art phenolic, elastomeric, graphite materials were used. (Modified author abstract)
GRA

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

N75-12072# Technische Universitaet, Hanover (West Germany).
THE VISCOSITY OF INDIUM (3) HALIDES Ph.D. Thesis [DIE VISKOSITAET VON INDIUM (3) HALOGENIDEN]
Claus Schoeneborn 9 Feb. 1974 116 p refs In GERMAN
Avail: NTIS HC $5.25

Viscosity measurements on indium (III) bromide and indium (III) iodide melts are reported and their temperature dependence are analyzed. Results show that the observed viscosities and constants are typical for group 3 compounds elements, and that ion-molecular equilibrium in the iodide melts is more pronounced than in bromide melts. Transl. by G.G.

N75-12073# Research Inst. of National Defence, Sundbyberg (Sweden).
CHEMICAL REACTION ENGINEERING [KEMISK REAKTIONSTEKNIK]
Gosta Linder Mar. 1973 72 p refs In SWEDISH
(FOA-1-C-1515-H3) Avail: NTIS HC $4.25

The development of chemical reaction engineering in U.S.A. and Europe is reviewed. Past symposia on the subject up to and including Amsterdam 1972 and the CHISA Congress in Prague, September 1972, are discussed, concluding with a quick look forward. Author

N75-12074# Washington Univ., Seattle. Dept. of Biochemistry.
REPAIR OF RNA
M. P. Gordon 1974 10 p refs Presented at DNA Repair Processes Conf., Squaw Valley, Calif., Feb. 1974 Sponsored by AEC
(RLO-2225-T-15-19; Conf-740231-3) Avail: NTIS HC $3.25

Progress is reported on studies of photorepair mechanisms active on RNA in UV-irradiated plant viruses; the photoreactivation of UV-irradiated TMV-RNA on white leaves of a variegated mutant host which lacked chlorophyll; the ability of xanthi plants to photoreactivate UV-killed TMV-RNA as a function of light color and intensity; and the in vitro photoreactivation of TMV-RNA in cell-free extracts of tobacco plants. NSA

N75-12075# Rochester Univ., N.Y.
FUNDAMENTAL STUDIES IN ISOTOPE CHEMISTRY Progress Report, 1 Jul. 1973 - 30 Jun. 1974
J. Bigeleisen 30 Jun. 1974 22 p refs
(Contract AT(11-1)-3498)
(COO-3498-15) Avail: NTIS HC $3.25

Experimental and theoretical studies are directed toward the establishment and understanding of the relationship between isotope effects and molecular and intermolecular forces. Isotope effects are used to study liquid structure in simple atomic and molecular fluids. Measurements were made of the vapor pressures ratios of C-1202/C-1302 and C-1602/C-1802 from 154 to 217K (0.3 above the triple point). The results were interpreted in terms of the statistical mechanical theory of condensed phase isotope effects. Quantitative agreement is formed between the experimental results and a theoretical calculation of the lattice dynamics of the solid. The latter also confirm inelastic neutron diffraction and infrared and raman spectra. The contribution of stretching and bending forces to the total deuterium isotope effect in the

prototype molecules H2O2, CH4, Ch2O2, C2H4, C2H6, and C6H6 were calculated as a function of temperature. Remarkable additivity was found when the basis coordinates used are internal coordinates. Author (NSA)

N75-12076# Pittsburgh Univ., Pa. Dept. of Chemistry.
HYDROGEN SOLUBILITY IN 1:5 COMPOUNDS BETWEEN Y OR Th AND Ni OR Co
T. Takeshita, W. E. Wallace, and R. S. Craig 1973 9 p refs Sponsored by AEC
(COO-3429-19) Avail: NTIS HC $3.25

Pressure-composition isotherms for the RCo5-H system are reported. For comparison purposes YNi5, ThCo5, and ThNi5 were examined as possible solvents for hydrogen. YCo5 and ThCo5 absorb hydrogen gas reversibly giving the limiting composition ratio of hydorgen atom to compound, N(H) approximately 3.0 in both cases. YNi5 and ThNi5 do not absorb hydrogen gas under the applied pressure of up to 150 atm. NSA

24 COMPOSITE MATERIALS

Includes laminates.

N75-12077*# Pratt and Whitney Aircraft, East Hartford, Conn.
IMPACT RESISTANCE OF HYBRID COMPOSITE FAN BLADE MATERIALS
L. A. Friedrich May 1974 54 p refs
(Contract NAS3-17789)
(NASA-CR-134712; PWA-TM-5022) Avail: NTIS HC $4.25 CSCL 11D

Improved resistance to foreign object damage was demonstrated for hybrid composite simulated blade specimens. Transply metallic reinforcement offered additional improvement in resistance to gelatin projectile impacts. Metallic leading edge protection permitted equivalent-to-titanium performance of the hybrid composite simulated blade specimen for impacts with 1.27 cm and 2.54 cm (0.50 and 1.00 inch) diameter gelatin spheres. Author

N75-12078# Aeronautical Research Labs., Melbourne (Australia).
THE EFFECT OF NEUTRON IRRADIATION ON THE STRUCTURE AND MECHANICAL PROPERTIES OF CARBON FIBRES
B. J. Wicks Mar. 1974 17 p refs
(ARL/Met-REPT-93) Avail: NTIS HC $3.25

the effect of fast neutron irradiation on the mechanical and microstructural properties of carbon fibers heat-treated to various sstages of graphitization has been investigated. Changes in selected crystallinity parameters were used to monitor the microstructural disorder induced in each fiber type by the three different irradiation doses. Associated changes in fracture strength and Young's modulus are related to the dependence of dislocation mobility on short-range microstructural damage. Author

N75-12079# Commissariat a l'Energie Atomique, Fontenay-aux-Roses (France). Dept. d'Etudes des Combustibles a Base de Plutonium.
PREPARATION OF SUBSTOICHIOMETER TITANIUM CARBIDES AND MIXED TITANIUM-TANTALUM CARBIDES Ph.D. Thesis - Paris Univ.
D. Rossignol Jan. 1974 62 p refs In FRENCH
(CEA-N-1684) Avail: AEC Depository Libraries HC $6.25

A method is presented for the preparation of titanium carbides suitable for fabricating pure samples having a wide range of carbon substoichiometry. The carbon/titanium hydride power mixture is compacted and then heated under vacuum to 1500C. The products are then subjected to a homogenizing-sintering-treatment. The compositions obtained are the bases for new curves to be plotted for the variations of the carbide unit cell parameter as a function of the carbon contents. The substoichiometry range is limited to 100 titanium atoms per 48 carbon atoms because beyond this value, the fcc structure ceases to exist. The method was modified to treat mixed titanium/tantalum carbides. A homogenizing-sintering furnace was constructed to treat samples under vacuum up to a temperature of 2600C. NSA

N75-12080# Kernforschungsanlage, Juelich (West Germany). Inst. fuer Reaktorwerkstoffe und Heisse Zellen.
PYROCARBON AND ITS APPLICATION TO REACTOR TECHNOLOGY
H. Nickel 1974 31 p refs Presented at the Conf. on Struct.-Property Relationships in Thick Film and Bulk Coatings, San Francisco, 28 Jan. 1974
(GERHTR-86; Conf-740103-4) Avail: AEC Depository Libraries HC $4.75

A survey of deposition methods for pyrocarbons is given, especially the fluidized bed process for nuclear fuel kernel coating. Structures of pyrocarbons are dependent on such parameters as deposition temperature, nature and pressure of the pyrolysis gas, substrate, geometry of the deposition system. It is possible, with the fluidized bed process, to deposit isotropic pyrocarbon layers which are much more resistant to fast neutron irradiation than anisotropic pyrocarbon coatings. The determination of apparent density, BACON-anisotropy-factor, and apparent crystallite size is not sufficient to characterize this material, and efforts have been made to develop new methods. The physical procedures are the determination of the optical anisotropy factor, measurement of the microporosity distribution, and transmission and scanning electron-microscopy. Chemical methods are plasma- and wet-oxidation processes. NSA

N75-12081# IIT Research Inst., Chicago, Ill.
FILAMENTARY COMPOSITE LAMINATES SUBJECTED TO BIAXIAL STRESS FIELDS Final Technical Report, 3 Mar. 1970 - 31 Aug. 1973
Bill W. Cole and Robert Byron Pipes Jun. 1974 413 p refs Prepared in cooperation with General Dynamics/Fort Worth, Tex.
(Contract F33615-70-C-1298; AF Proj. 4364)
(AD-785362; AFFDL-TR-73-115) Avail: NTIS CSCL 11/4

A study is presented in which four biaxial test specimens suitable for composite materials are evaluated - the off-axis coupon, the bulge plate, the tubular specimen and the crossbeam. Improved specimen design and data reduction techniques are presented for the off-axis coupon. Also, a novel technique for testing tubes without mechanical attachment is presented. Feasibility tests were conducted with both test methods, primarily on the Narmco 5505 boron-epoxy system, both in laminate and unidirectional form. The biaxial data is presented and the results are discussed. The maximum strain, Hill and Tsai-Wu failure criteria are used to predict biaxial behavior of composite materials. Hypothetical design allowable interaction diagrams are presented and compared to the biaxial data. (Modified author abstract) GRA

N75-12082# Whittaker Corp., San Diego, Calif. Research and Development Div.
MANUFACTURING METHODS TECHNOLOGY (MM AND T) FOR BALLISTICALLY TOLERANT REPLACEMENT FLIGHT CONTROL COMPONENTS Final Report, May 1972 - Feb. 1974
Rune Anderson Jul. 1974 74 p refs
(Contract DAAJ02-72-C-0115)
(AD-785582; MJO-4409; USAAMRDL-TR-74-59) Avail: NTIS CSCL 13/8

The objective of this program was to develop manufacturing methods and technology for producing glass reinforced plastic, ballistically tolerant flight control components with a high degree of reliability while utilizing low-cost fabrication techniques. This objective was achieved through development of component designs to obtain simplicity and ease of manufacture. Maximum use was made of commercially available, finished material forms which required a minimum of additional processing. Matched die molding processes were developed which allowed rapid manufacture of parts to final net dimensions. Assembly techniques were developed which utilized adhesive bonding in precision fixtures and allowed a high degree of reproducibility and reliability of the finished component. (Modified author abstract) GRA

N75-12083# Case Western Reserve Univ., Cleveland, Ohio. Electrochemistry Research Lab.
DIFFERENTIAL CAPACITANCE STUDY ON THE EDGE ORIENTATION OF PYROLYTIC GRAPHITE AND GLASSY CARBON ELECTRODES

Jean-Paul Randin and Ernest Yeager 1 Jul. 1974 29 p refs (Contract N00014-67-A-0404-0006; NR Proj. 359-451) (AD-785263; TR-38) Avail: NTIS CSCL 07/4

The differential electrode capacitance of the edge orientation (plane perpendicular to the basal one) of stress-annealed pyrolytic graphit and glassy carbon have been studied in concentrated aqueous solutions using an a.c. impedance bridge. The apparent differential capacity for the edge orientation of stress-annealed pyrolytic graphite is much higher than on the basal plane because of higher surface roughness and capacitive contribution of the surface groups. The capacity strongly depends on the electrolyte, pH and potential scan range and exhibits a complex potential dependence, probably as a result of the specific chemical groups on the surface. A model is proposed to explain the behavior of the edge orientation. The capacity minimum for the glassy carbon is sufficiently low so as to suggest a space charge contribution from within the electrode phase. (Modified author abstract) GRA

N75-12084# Monsanto Co., St. Louis, Mo.
MOLDING OF ORIENTED SHORT-FIBER COMPOSITES. 4: CHARACTERIZATION OF FIBER ORIENTATION PATTERNS
Lloyd A. Goettler Aug. 1974 40 p refs
(Contract N00014-67-C-0218; ARPA Order 876; NR Proj. 356-484)
(AD-785266; HPC-72-151) Avail: NTIS CSCL 11/4

The various considerations underlying the specification and characterization of three-dimensional orientation distributions in moldings of short fiber reinforced polymers are discussed. The recommended treatment resolves the overall complex orientation pattern into distributions on a macroscopic and microscopic scale. Some examples, including the effects of molding conditions, are given for an end-gated rectangular bar plunger molded from fiberglass reinforced epoxy. Author (GRA)

N75-12085# Naval Ordnance Lab., White Oak, Md.
A THREE-DIMENSIONAL STRUCTURE MODEL FOR A HIGH MODULUS PAN-BASED CARBON FIBER
F. Robert Barnet and Marriner K. Norr 24 Jun. 1974 33 p refs
(AD-784415; NOLTR-73-154) Avail: NTIS CSCL 11/5

A new three-dimensional structural model is proposed for MODMOR I, meter length, high modulus PAN-based carbon fibers. The model depicts a macrostructure consisting of long-range crystalline graphitic material in the form of a circumferentially oriented outer shell connected to a central core by a honeycombed radial continuum. Within this continuum are radially oriented pockets of various sizes and shapes containing a graphitic phase of short-range crystallinity. The fiber structure also contains internal voids, flaws, cracks, and residual strains as well as surface flaws. This model suggests that one approach for improving the mechanical properties of high modulus PAN-based fibers is to form and process the precursor fibers under conditions which will minimize the occurrence of short-range crystalline material, as well as other anomalies and imperfections, in the final carbon fiber. Author (GRA)

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics*.

N75-12086* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
AUTOMATED ANALYSIS OF OXIDATIVE METABOLITES Patent
Raymond L. Furner, inventor (to NASA) (NAS-NRC) Issued 5 Nov. 1974 7 p Filed 18 Aug. 1972 Supersedes N72-31145 (10 - 22, p 2927) Sponsored by NASA
(NASA-Case-ARC-10469-1; US-Patent-3,846,243; US-Patent-Appl-SN-281908; US-Patent-Class-195-103.5R) Avail: US Patent Office CSCL 07D

An automated system for the study of drug metabolism is described. The system monitors the oxidative metabolites of aromatic amines and of compounds which produce formaldehyde on oxidative dealkylation. It includes color developing compositions suitable for detecting hyroxylated aromatic amines and formaldehyde. Official Gazette of the U.S. Patent Office

N75-12087* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
METHOD OF PREPARING WATER PURIFICATION MEMBRANES Patent
John R. Hollahan (NAS-NRC) and Theodore Wydeven, inventors (to NASA) (NAS-NRC) Issued 12 Nov. 1974 6 p Filed 8 Dec. 1972 Supersedes N73-29074 (11 - 20, p 2374) Sponsored by NASA
(NASA-Case-ARC-10643-1; US-Patent-3,847,652; US-Patent-Appl-SN-513389; US-Patent-Class-117-93.1GD; US-Patent-Class-117-161UA; US-Patent-Class-117-161UN; US-Patent-Class-117-161UZ; US-Patent-Class-204-177; US-Patent-Class-210-500; US-Patent-Class-264-22; US-Patent-Class-264-217) Avail: US Patent Office CSCL 07D

Allyl amine and chemically related compounds are polymerized as thin films in the presence of a plasma discharge. The monomer compound can be polymerized by itself or in the presence of an additive gas to promote polymerization and act as a carrier. The polymerized films thus produced show outstanding advantages when used as reverse osmosis membranes.
Official Gazette of the U.S. Patent Office

N75-12088*# Tennessee Univ., Knoxville. Molecular Spectroscopy Lab.
THE nu sub 2 BAND CHD3; GROUND STATE PARAMETERS FOR CHD3 FROM COMBINATION DIFFERENCES
D. E. Jennings and W. E. Blass 1974 22 p refs
(Grant NGL-43-001-006)
(NASA-CR-140861) Avail: NTIS HC $3.25 CSCL 07D

The nu sub 2 fundamental band of CHD3, centered near 2143/cm, was recorded at a resolution of 0.015-0.25/cm. Analysis of ground state combination differences yielded well-determined values for the ground state molecular parameters for CHD3. These parameters were used in the determination of the alpha and beta molecular parameters for nu sub 2.
Author

N75-12089# Technische Universitaet, Hanover (West Germany).
X-RAY TOPOGRAPHIC STUDY OF CRYSTAL DEFECTS PRODUCED BY DIFFUSION OF ADDITIVE ELEMENTS IN SINGLE GERMANIUM CRYSTALS Ph.D. Thesis [ROENTGENTOROGRAPHISCHE UNTERSUCHUNG DER DURCH DIFFUSION VON DOTIERUNGSELEMENTEN ERZEUGTEN KRISTALLSTOERUNGEN IN GERMANIUMEINKRISTALLEN]
Gerhard Kelber 20 Dec. 1973 101 p refs In GEORGIAN
Avail: NTIS HC $5.25

Topographic X-ray diffraction analysis on antimony and arsenic diffusion in single germanium crystals showed lattice dislocations in the diffusion zone up to 2x10 to the 17th power antimony atoms per cu cm, and up to 7x10 to the 16th power arsenic atoms per cu cm depth. Transl. by G.G.

N75-12090# Technische Universitaet, Munich (West Germany).
METHOD FOR DETERMINING MINORITY CARRIER LIFE IN EPITAXIAL SILSCON LAYERS SUMMARY Ph.D. Thesis [VERFAHREN ZUR BESTIMMUNG DERMINORITAKETSTRAEGERLEBENSDAUER IN EPITATYISCHEN SILIZIUM SCHICHTEN]
Herbert Reichl 21 Feb. 19784 37 p refs In GERMAN
Avail: NTIS HC $3.75

The photon flow in the diffusion zone of a Schottky contact is a measure for diffusion length of active minority carriers. Brightness modulated light penetration produces a frequency dependent photon flow sustained by the duration of excited minority carrier life. Laser measurements at known wavelengths on epitaxial silicon layers establish a correlation between minority

carrier life duration and transistor power production.
Transl. by G.G.

N75-12091# Defence Standards Labs., Maribyrnong (Australia).
STIMULATED CHEMILUMINESCENCE IN THE ALKALIHALIDES
R. K. Garsworthy Jul. 1974 23 p refs
(TN-336) Avail: NTIS HC $3.25

Spontaneous and stimulated chemiluminescent rates in cesium-iodide vapor are calculated. The feasibility of a high-power tunable laser utilizing cesium-iodide chemiluminescence is discussed. Author

N75-12092# Defence Standards Labs., Maribyrnong (Australia).
INTERFEROMETRIC STUDY OF SOME ORGANOTIN POLYMERS
C. E. M. Morris Aug. 1974 10 p refs
(DSL-TN-388) Avail: NTIS HC $3.25

The specific refractive index increments of poly (tri-n-butyltin acrylate) and poly (tri-n-butyltin methacrylate) in a number of solvents including n-heptane, cyclohexane and toluene, have been determined interferometrically. The refractive index and specific volume of these polymers have been calculated from the Gladstone-Dale relation. Author

N75-12093# Defence Standards Labs., Maribyrnong (Australia).
THE SEMIMICRO DETERMINATION OF POTASSIUM CHLORATE AND LEAD THIOCYANATE IN PRIMING COMPOSITIONS
R. G. Davidson and F. D. McPherson Jul. 1974 13 p refs
(DSL-TN-339) Avail: NTIS HC $3.25

Procedures are described for the semimicro determination of thiocyanate and chlorate in priming compositions containing both lead thiocyanate and potassium chlorate. Both methods are spectrophotometric and are useful for 20-30 mg samples. Thiocyanate was determined by the reaction with ferric ions, and chlorate by the reaction with methyl orange in acid solution. Author

N75-12094# Southampton Univ. (England). Dept. of Aeronautics and Astronautics.
A UNIFIED STATISTICAL MODEL OF THE PREMIXED TURBULENT FLAME
K. N. C. Bray and J. B. Moss Nov. 1974 68 p refs
(AASU-335) Avail: NTIS HC $4.25

A unified statistical analysis is presented of the premixed turbulent flame supported by a single-step global reaction. A set of time-averaged balance equations, derived from the exact equations of reacting turbulent flow under a thin shear layer are used to obtain equations which are capable of spanning the range from chemistry to mixing-limited combustion. An approximate description of turbulent mixing-limited combustion is shown to lead to an explicit time-averaged reaction rate expression similar to Spalding's eddy break-up model. Some alternative forms of the probability density function encompassing wrinkled laminar flames and distributed reaction are suggested. Their impact on both the model proposed and the statistical behavior of experimental observables is investigated. Author

N75-12095# Research Inst. of National Defence, Stockholm (Sweden).
ON THE POSSIBILITIES OF A DIRECTLY IGNITING FUSION CHARGE [OM MOEJLIGHETEN ATT GOERA DIREKTTANDA FUSIONSLADDNINGAR]
Gustav During Feb. 1973 20 p refs In SWEDISH
(FOA-4-C-4530-A1) Avail: NTIS HC $3.25

A directly igniting fusion charge refers to a charge which is ignited by some non-nuclear process. It has been calculated that to ignite a thermonuclear combustion in a mixture of equal parts deuterium and tritium requires between 10,000 and to the 9th power J supply of energy, depending on the density of the fusion materials. The higher value corresponds to the density at a nearly completely frozen state of the mixture, the lower to a compression 10,000 times that density. None of the many methods of initiation discussed seems likely to be realized from present day development. The two methods considered nearest to realization consist of irradiating the fusion material with intensive, high energy electron beams or compression by irradiation with a laser. Author

N75-12096# Research Inst. of National Defence, Sundbyberg (Sweden).
REPORT ON THE 9TH INTERNATIONAL SYMPOSIUM ON CHROMATOGRAPHY [RAPPORT FRAN 9TH INTERANATIONAL SYMPOSIUM ON CHROMATOGRAPHY]
Bo Jansson Nov. 1972 11 p In SWEDISH Conf. held at Montreux, Switzerland, 9 - 13 Oct. 1972
(FOA-1-C-1489-C4) Avail: NTIS HC $3.25

Lectures and discussions presented are about gas-chromatography, but modern liquid chromatography is also dealth with. The report mentions selected items as well as the exhibition which was organized at the end of the symposium. Author

N75-12097# Defence Standards Labs., Maribyrnong (Australia).
A WAVELENGTH SORTING METHOD FOR ELECTRON PROBE X-RAY MICROANALYSIS
N. M. Buckland Aug. 1974 31 p ref
(DSL-600) Avail: NTIS HC $3.75

A method of identifying spectrometer peaks in unknown element electron probe X-ray microanalysis is described, and details of a computer program which carries out the procedure are given. Use of the method with a time sharing computer produces a best element list, including a summary of any overlapping within the list, a few seconds after the spectrometer peak values have been entered into the operator's teletype. Author

N75-12098# Technische Universitaet, Hanover (West Germany).
DENSITY AND COMPRESSIBILITY STUDIES ON HOMOLOGOUS ROWS OF ETHERS, KETONES, DIOLES UP TO 4000 BAR AND 80 C Ph.D. Thesis [DICHTE-UND KOMPRESSIBILITAETSUNTERSUCHUNGEN AN HOMOLOGEN REIHEN DER AETHER, KETONE, DIOLE BIS 4000 BAR UND 80 C]
Juergen Kramer 1974 159 p refs In GERMAN
Avail: NTIS HC $6.25

A procedure is developed to measure pVT data in the pressure region of 0 to 4000 kp/sq cm and at temperatures between 0 and 80C. Homological series methods are used to determine density functions for 17 organic liquids; the most important phase equations are used to calculate density and compressibility for ether- ketone-,and alkane-diole homologies. Results show that initial compressibilities depend on chain length, a characteristic that diminishes with increased pressures. Increased pressure lowers the effects of the functional group, chain length and temperature and is almost completely absent at 4000 kp/sq cm. The pressure dependence of the physical parameters in the liquid phases represents the structure of the single molecules and their intermolecular exchange reactions. Transl. by G.G.

N75-12099# Commissariat a l'Energie Atomique, Grenoble (France).
STUDY OF MOLECULAR DYNAMICS IN NEMATIC AND ISOTROPIC PHASES OF LIQUID CRYSTALS Ph.D. Thesis - Univ. Sci. et Med. de Grenoble
A. Farinha-Martins May 1974 159 p refs In FRENCH
(CEA-R-4492) Avail: AEC Depository Libraries HC $11.00

A theoretical and experimental study was made of magnetic relaxation and nuclear resonance in the nematic and isotropic phases of liquid crystals. Data cover: (1) description of elementary macroscopic properties of different types of liquid crystals, (2) development of a fundamental theory for liquid nematic crystals, (3) examination of transition points during nematic and isotropic phases, and (4) essential results and problem areas identified in the study. Transl. by E.H.W.

N75-12100# Liquid Metal Engineering Center, Canoga Park, Calif.
CHEMICAL AND PHYSICAL TESTING OF THERMAL INSULATION MATERIALS FOR USE AT FFTF AND SPTF
J. K. Balkwill 1 Apr. 1974 225 p refs
(Contract AT(04-3)-700)
(LMEC-74-6) Avail: NTIS

Chemical and physical testing of 26 thermal insulation materials was performed to qualify selected materials for further

evaluation and possible use at the Fast Flux Test Facility and the Sodium Pump Test Facility. All materials tested showed satisfactory compatibility with 1050 F sodium in air; the sodium tended to burn out on the surface of the denser materials, and penetrated into the felt-type materials. The thermal insulation materials judged acceptable according to the chemical analysis requirements governing chloride and inhibitor content totaled 19, 13 of which passed the stress corrosion cracking test. The 13 materials that met all chemical test requirements included calcium silicate and refractory fiber felted types, both suitable for rigid thermal insulation; loose wool and blanket types, suitable for free-form thermal insulation; structural board types, suitable for components such as pipe supports where high strength is needed; and extra-low-conductivity types. One calcium silicate material and one felted type successfully passed a 24-hr 1500 F heater contact test. Author (NSA)

N75-12101# Sandia Labs., Albuquerque, N.Mex.
HIGH PRESSURE DIFFERENTIAL THERMAL ANALYSIS EXPERIMENTS WITH THE LaNi5-H SYSTEM
R. P. Wemple 1973 15 p refs Presented at 3d ARAZ Symp., Albuquerque, New Mexico, 5 Jun. 1974 Sponsored by AEC
(SLA-74-5322; Conf-740634-1) Avail: NTIS HC $3.25

Experiments have been performed on the LaNi5-H system using differential thermal analysis (DTA) device capable of 680 atm. Interpretation of the experimental results confirms that the DTA technique is a reliable qualitative method for determining phase boundaries, thermodynamic properties, transition temperature, and hydriding susceptibility of materials. General information on the kinetics of the hydriding reaction and effects of sample contamination can also be obtained. Author (NSA)

N75-12102# Argonne National Lab., Ill.
HIGH-TEMPERATURE THERMODYNAMIC PROPERTIES OF SODIUM
A. Padilla, Jr. Apr. 1974 65 p refs
(Contract W-31-109-eng-38)
(ANL-8095) Avail: NTIS HC $4.25

A set of high-temperature thermodynamic properties for sodium in the two-phase and subcooled-liquid regions is predicted for the region between the low-temperature properties recommended by Golden and Tokar and the critical temperature. This set of high-temperature properties is recommended for consistent thermodynamic calculations in reactor-safety analyses involving sodium. The saturation properties determined are: vapor pressure, liquid and vapor density, liquid and vapor enthalpy, liquid and vapor entropy, liquid compressibility (adiabatic and isothermal), liquid thermal-expansion coefficient, and liquid specific heat (constant-pressure and constant-volume). The subcooled-liquid properties determined are: pressure, enthalpy, entropy, compressibility (adiabatic and isothermal), thermal-expansion coefficient, and specific heat (constant-pressure and constant-volume). Author (NSA)

N75-12103# Commission of the European Communities, Ispra (Italy).
DETERMINATION OF MERCURY BY CONTROLLED POTENTIAL COULOMETRY: AN OUTLAY FOR AUTOMATIC PERFORMANCE
H. Huntau and R. Cenci May 1974 22 p refs
(EUR-5125) Avail: AEC Depository Libraries HC $4.25; EUR B.Fr. 40

The determination of mercury by controlled-potential coulometry in the presence of CaBr2 concentrations between 0.05 and 1.5 M and HBr concentrations between 0.1 and 1.0 M is possible using perchloric acid as a basal electrolyte. The mercury amounts needed for each determination range from ca. 40 mg to 10 micrograms. The precision obtainable is better than 0.25% for the higher concentration range (e.g., between 1 and 40 mg). This determination was made in a study of the HgO precipitation and CaBr2 regeneration step of hydrogen production by nuclear heat. Author (NSA)

N75-12104# Los Alamos Scientific Lab., N.Mex.
X-RAY SPECTROGRAPHIC DETERMINATION OF IRIDIUM IN LiH OR LiD
J. M. Hansel and E. A. Hakkila Feb. 1974 4 p refs
(Contract W-7405-eng-36)
(LA-5564) Avail: NTIS HC $3.25

Iridium is determined in LiH or LiD using a fusion-X-ray fluoresence technique. Samples are fused at 870 K, the residue is dissolved in HCl, and the solutions are fumed with HNO3 to remove chloride. Platinum is added as an internal standard, and the intensites of the L alpha sub 1 X-rays of iridium and platinum are measured. The Ir/Pt X-ray intensity ratio is compared to ratios measured for reference materials having known compositions which have been prepared in the same manner as the samples. The relative standard deviation for measuring 1 to 10 mg. of iridium is between 2 and 0.4%. Thulium and lutetium interfere when present in amounts greater than approximately 1%. Author (NSA)

N75-12105# Sandia Labs., Livermore, Calif.
ANALYSIS OF FLAME EMISSIONS BY LASER RAMAN SPECTROSCOPY
R. E. Setchell May 1974 58 p refs Presented at Meeting on Western States Section/The Combustion Inst., Pullman, Wash., 6 May 1974
(Contract AT(29-1)-789)
(SLL-74-5244; Conf-740536-1) Avail: NTIS HC $4.25

Raman scattering experiments in the post-flame region of methane-air flames are performed using a unique ellipsoidal mirror system to enhance the laser power incident upon a small test volume. The linearity, spatial resolution, and sensitivity of the system are defined. Theoretical calculations of spectrometer-resolved Q-branch bands of nitrogen at elevated temperatures permit accurate temperatures to be measured from recorded nitrogen spectra. Axial and transverse temperature distributions within the post-flame region are demonstrated. Q-branch bands of major flame species are shown over a range of fuel/air equivalence ratios. Theoretical calculations of carbon monoxide bands at elevated temperatures enable absolute carbon monoxide concentrations to be measured for rich flames. Measured concentrations agree with values found from equilibrium calculations using measured temperatures to within 8%. NSA

N75-12106# Oak Ridge National Lab., Tenn.
TEMPERATURE DEPENDENCE OF THE FERROMAGNETIC RESONANCE LINEWIDTH OF LUNAR SOILS, IRON AND MAGNETITE PRECIPITATES IN SIMULATED LUNAR GLASSES, AND NONSPHERICAL METALLIC IRON PARTICLES
E. J. Friebele, D. L. Griscom, C. L. Marquardt, R. A. Weeks, and D. Prestel 6 Jun. 1974 20 p refs Presented at 5th Lunar Sci. Conf., Houston, Tex., 18 Mar. 1974 Sponsored by AEC
(Conf-740 321-2) Avail: NTIS HC $3.25

The temperature dependence of the ferromagnetic resonance (FMR) linewidth of a suite of lunar soils and simulated lunar glasses containing iron and magnetite precipitates was studied. It was determined that the normalized linewidths of the lunar soils exhibit temperature dependences distinctly different from that of a simulated lunar glass containing pure metallic iron precipitates in the 100-150A size range, which was noted to behave in accordance with a theoretical prediction for pure metallic iron. A calculation was made of the effect of shape anisotropy on the temperature dependence of the FMR linewidth of metallic iron. It was determined that the degree of nonsphericity can be at most 2% for agreement with the lunar soil data in the high temperature region (T approximately equal to or greater than 350 K), but even for perfect spheres there is no agreement in the low temperature region (T approximately equal to or greater than 350 K). However, the lunar soil normalized linewidth-vs-temperature plots were found to be qualitatively the same as the behavior of ferric ion spinel precipitates in simulated lunar glasses. Author

N75-12107# Illinois Univ., Urbana.
DEBYE-WALLER MEASUREMENTS IN SILICON
W. H. Hardy, II May 1974 78 p refs
(Contract AT(11-1)-1198)
(COO-1198-1075) Avail: NTIS HC $4.75

Isothermal and temperature dependent measurements of X-ray structure factors have been made on single crystal silicon. The isothermal measurements included data on 2012 reflections. The temperature dependent measurements include data on

5 reflections over a temperature range of 20 K to 300 K. The structure factors have been analyzed to give Debye-Waller parameters. These have in turn been analyzed to give Debye equivalent characteristic temperatures. Divergence between the low temperature results and predictions based on calorimetric data are discussed. The results obtained at higher temperatures agree well with electronic charge density calculations and with predictions based on calorimetric data. NSA

N75-12108# Pittsburgh Univ., Pa. Dept. of Chemistry.
SOLUBILITY OF H2 IN RCo3 COMPOUNDS
T. Takeshita, W. E. Wallace, and R. S. Craig 1973 8 p refs Sponsored by AEC
(COO-3429-20) Avail: NTIS HC $3.25

RT3 systems (R = Dy, Ho, or Er) were investigated in regard to their capability as hydrogen host lattices and their potential for hydrogen storage. The present study provided information on the maximum solubility H2 in the RCo3 phases and pressure-composition-temperature data for RCo3-H2 systems. NSA

N75-12109# Naval Research Lab., Washington, D.C.
INFORMATION STORAGE IN PHOTODICHROIC CRYSTALS Annual Report, May 1973 - Jun. 1974
W. C. Collins, I. Schneider, M. E. Gingerich, and P. H. Klein Aug. 1974 38 p refs
(RF21242102)
(AD-785005; NRL-MR-2858) Avail: NTIS CSCL 20/12

The dichroism photosensitivity of the M center in NaF and the M sub A center in KCl:NaCl has increased by more than an order of magnitude by doping with certain electron trapping impurities. Efforts to improve the fatigue resistance of NaF at room temperature have proceeded along two lines; (1) the formation of M sub A centers and (2) the elimination of interstitial defects. The M sub A center has been formed in NaF:LiF but it is not as stable as the analogous center in KCl:NaCl, and thus does not lead to improved fatigue resistance. The dispersion of M centers in NaF has been measured and found to be sufficient to predict appreciable diffraction efficiencies and suggest holographic applications. (Modified author abstract) GRA

N75-12110# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
COMBUSTION MECHANISM OF PARTICLES OF ALUMINUM-MAGNESIUM ALLOYS
E. I. Popov, L. Ya. Kashporov, V. M. Maltsev, and A. L. Breiter 23 Aug. 1974 14 p refs Transl. into ENGLISH from Fiz. Goreniya Vzryva (Novosibirsk), v. 9, no. 2, Mar. - Apr. 1973 p 240-246
(AD-785205; FTD-HT-23-1238-74) Avail: NTIS CSCL 21/2

The authors have studied the combustion process of individual particles of aluminum-magnesium alloys under atmospheric pressure. The particles contained 5, 10, 20, 50, 70, 90, and 95% magnesium and were prepared in the form of spheres measuring from 100 to 600 micrometers. The studied particle was placed on the point of a tungsten needle and burned in air or in the flame of compressed mixtures of ammonium perchlorate and urotropine, which have calculated temperatures of 2500, 2700, and 3100K. In the case of combustion in air the particles were ignited from a miniature Silit rod, heated by an electrical current. The combustion process was studied with a movie camera with magnification of up to x10. GRA

N75-12111# Army Electronics Command, Fort Monmouth, N.J.
THE DEPOSITION OF Er-Eu-Ga-Fe GARNET SINGLE CRYSTAL FILMS Final Report, Sep. 1972 - Oct. 1973
William L. Wede, Jr. Aug. 1974 15 p refs
(DA Proj. 1S7-62705-AH-94)
(AD-785511; ECOM-4236) Avail: NTIS CSCL 20/2

This report details a facility for the fabrication of europium-erbium garnet films for computer memory applications. Magnetic bubbles produced by the dipping method, and the substrate material are included. Variations in the garnet formula and the extent of success are discussed. Author (GRA)

N75-12112# ARO, Inc., Arnold Air Force Station, Tenn.
FORMATION OF MIXED MOLECULAR CLUSTERS IN FREE-JET EXPANSIONS Final Report, 16 May - 22 Jun. 1973
A. B. Bailey and H. M. Powell AEDC Sep. 1974 46 p refs
(AF Proj. 6687)
(AD-785347; ; ARO-VKF-TR-74-14; AEDC-TR-74-39) Avail: NTIS CSCL 21/2

To determine the concentrations of jet engine pollutants in the stratosphere, it is necessary to obtain information concerning the molecular clustering characteristics of pollutant species. In the present investigation, a simulation of jet engine exhaust emissions has been accomplished by expanding various gas/water mixtures from a molecular beam source and mass analyzing the resulting molecular beam. It was found possible to produce ionic clusters containing various combinations of N2, CO2, SO2, CH4, and H2O. (Modified author abstract) GRA

N75-12113# Midwest Research Inst., Kansas City, Mo.
VAPORIZATION KINETICS AND THERMODYNAMICS OF GRAPHITE USING THE HIGH PRESSURE MASS SPECTROMETER Final Technical Report, 1 Jul. 1968 - 15 Oct. 1973
Thomas A. Milne, Jacob E. Beachey, and Frank T. Greene May 1974 224 p refs
(Contract F33615-73-C-5008; AF Proj. 7360)
(AD-785136; AFML-TR-74-57) Avail: NTIS CSCL 07/4

An apparatus for producing and sampling graphite vapor was developed and studies of the vaporization of graphite were performed. An all-graphite Knudsen cell was heated to about 3300K in vacuum without significant heating of the beam system walls or occurrence of objectionable outgassing. A continuously operating vacuum viewport and automatic pyrometer system allowed temperature monitoring under rapid window darkening conditions produced during vaporization runs. An extensive experimental determination of the neutral time-of-flight behavior of both carbon and low temperature gaseous species was done. Various ionic carbon clusters are identified. Experimental design and equipment are discussed. (Modified author abstract) GRA

N75-12114# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
METHOD OF SAMPLING PARTICLES FORMED DURING BURNING OF METALLIZED CONDENSED SYSTEMS IN CONSTANT-PRESSURE CHAMBER
G. I. Levashenko and L. P. Bakhir 23 Aug. 1974 10 p Transl. into ENGLISH from Fiz. Goreniya Vzryva (Novosibirsk), v. 9, no. 2, Mar.-Apr. 1973 p 330-331
(AD-785212; FTD-HT-23-1240-74) Avail: NTIS CSCL 07/4

The use of metal additives in condensed systems leads to the formation of solid particles of metal oxides in the combustion products. A knowledge of the granulometric composition of these particles is essential in studying the combustion mechanism of metallized condensed systems and calculating the spectral emissivity of the combustion products. The present work describes a method for sampling metal oxide particles formed during the burning of metallized condensed systems in a constant-pressure chamber. The sampling method is based on the use of a cermet filter. It provides full representation for particle dimensions in the sample. GRA

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N75-12115*# North Carolina State Univ., Raleigh.
THE RESISTANCE OF SELECTED HIGH STRENGTH ALLOYS TO EMBRITTLEMENT BY A HYDROGEN ENVIRONMENT
Ray B. Benson, Jr. [1974] 13 p refs
(Grant NGR-34-002-175)
(NASA-CR-140957) Avail: NTIS HC $3.25 CSCL 11F

Selected high strength iron base and cobalt base alloys were resistant to degradation of mechanical properties in a one atmosphere hydrogen environment at ambient temperature. These alloys were strengthened initially by cold working which produced strain induced martensite and fcc mechanical twins in

an fcc matrix. Heat treatment of the cobalt base alloy after cold working produced carbide precipitates with retention of an hcp epsilon phase which increased the yield strength level. High strength alloys can be produced which have some resistance to degradation of mechanical properties by a hydrogen environment under certain conditions. Author

N75-12116*# North Carolina State Univ., Raleigh. Dept. of Materials Engineering.
THE RESISTANCE TO EMBRITTLEMENT BY A HYDROGEN ENVIRONMENT OF SELECTED HIGH STRENGTH IRON-MANGANESE BASE ALLOYS
R. B. Benson, Jr., D. K. Kim, D. Atteridge (Minnesota Univ., Minneapolis), and W. W. Gerberich (Minnesota Univ., Minneapolis) [1974] 29 p refs
(Grant NGR-34-002-175)
(NASA-CR-140956) Avail: NTIS HC $3.75 CSCL 11F

Fe-16Mn and Fe-25Mn base alloys, which had been cold worked to yield strength levels of 201 and 178 KSI, were resistant to degradation of mechanical properties in a one atmosphere hydrogen environment at ambient temperature under the loading conditions employed in this investigation. Transmission electron microscopy established that bands of epsilon phase martensite and fcc mechanical twins were formed throughout the fcc matrix when these alloys were cold worked. In the cold worked alloys a high density of crystal defects were observed associated with both types of strain induced structures, which should contribute significantly to the strengthening of these alloys. High strength iron base alloys can be produced which appear to have some resistance to degradation of mechanical properties in a hydrogen environment under certain conditions. Author

N75-12117*# Kanner (Leo) Associates, Redwood City, Calif.
STUDY ON DEVELOPMENT OF HIGH Mn AUSTENITIC HEAT RESISTING STEEL: CHOICE OF BASE COMPOSITION AND THE EFFECT OF SMALL ADDITIONS OF Ti AND Nb
T. Mimino, K. Kinoshita, I. Minegishi, and T. Shinoda Washington NASA Dec. 1974 37 p refs Transl. into ENGLISH from Trans. Iron Steel Inst. Jap. (Japan), v. 55, no. 10, Sep. 1969 p 901-915
(Contract NASw-2481)
(NASA-TT-F-16043) Avail: NTIS HC $3.75 CSCL 11F

The most suitable chemical composition of high Mn austenitic stainless steel, developed for high-temperature applications, especially for boiler tubes, has been found to be 18% Cr-6% Ni-8% Mn. This steel's structure is almost wholly austenitic and its creep-rupture strength, oxidation resistance at high temperatures, and hot workability are comparable to type 304 steel. Small amounts of Ti and Nb, with an optimal (Ti + Nb)/C atomic ratio of 0.1 to 0.5 with 0.2% C, have been simultaneously added to this type of steel to improve the high-temperature strength. The resulting steel has considerably high creep-rupture strength at 600-700 C and is believed to be very economical in high-temperature applications. Depression of coalescence of M23C6 carbides in grains and on grain boundaries and fine dispersion of carbides within grain boundaries during use at high temperatures constitute the mechanism of raising creep-rupture strength due to additions of Ti and Nb. Author

N75-12118# Technische Universitaet, Munich (West Germany).
STUDIES ON N2 FIXATION IN TRANSITION METAL COMPLEXES OF CHROMIUM, MOLYBDENUM, AND TUNGSTEN Ph.D. Thesis [UNTERSUCHUNGEN ZUR N2-FIXIERUNG AN UEBERGANGSMETALLKOMPLEXEN VON CHROM, MOLYBDAEN UND WOLFRAM]
Gerhard Maisel 12 Feb. 1974 66 p refs In GERMAN
Avail: NTIS HC $4.25

The synthesis of hydrazime complexes of aromatic chromium tricarbonyl complexes is reported according to: ArCr(CO)2C5H8 + N2H4 yields ArCr(CO)2N2H4 + C5H8 (Ar = benzole, mesitylene, hexamethylbenzole, tetramethyl phenylenediamine). Substitution of the labile ligand cyclopentene with hydrazine and subsequent oxidation of the metal complexes yields di-nitrogen chromium complexes. Transl. by G.G.

N75-12119# Technische Universitaet, Munich (West Germany).
STUDIES ON NON-CRYSTALLINE IRON HALOGENID LAYERS BY APPLICATION OF MOSSBAUER SPECTROSCOPY Ph.D. Thesis [UNTERSUCHUNG NICHTKRISTALLINER EISENHALOGENIDSCHICHTEN UNTER ANWENDUNG DER MOESSBAUERSPEKTROSKOPIE]
Fred Jochen Litterst 16 Jan. 1974 143 p refs In GERMAN
Avail: NTIS HC $5.75

Mossbauer resonance spectra of FeCl2 and FeBr2 intermediate phases are similar to those of non-crystalline phases; quadrupole splittings are observed between those of the non-crystalline and crytalline phases. These effects are interpreted as lower crystal field diffraction for the non-crystalline phase and a higher diffraction for the crystal phase. It is concluded that the intermediate phase is formed through high dimer content in the molecular beam during evaporative deposition and that the structural units of the non-crystalline phases are determined by the structure of the condensated monomer molecules. Transl. by G.G.

N75-12120*# California Univ., Berkeley. Dept. of Materials Science and Engineering.
TOUGH CRYOGENIC ALLOYS FROM THE Fe-Mn AND Fe-Mn-Cr SYSTEMS
M. J. Schanfein, V. F. Zackay, and J. W. Morris, Jr. 18 Sep. 1974 31 p refs
(Grant NGR-05-003-562)
(NASA-CR-134688) Avail: NTIS HC $3.75 CSCL 11F

By adjusting composition, metastable gamma (austenite) and epsilon (hexagonal) martensite may be retained in Fe-Mn and Fe-Mn-Cr alloys and used to impact toughness through the TRIP mechanism. The resulting alloys have excellent toughness at cryogenic temperatures. The best alloys obtained to date are: Fe-20Mn, with sigma (sub y) = 79ksi and K sub IC = 275ksi square root of (in) at 77 K, and Fe-16Mn-8Cr, with sigma sub y = 85ksi and K sub IC = 72ksi square root of (in) at 77 K. Author

N75-12121# Technische Universitaet, Hanover (West Germany).
THE EFFECT OF HAFNIUM IN UNALLOYED CONSTRUCTION STEELS SIMILAR TO St 52-3, CONSIDERING ESPECIALLY THE HOT FORMING BEHAVIOR OF SULFIDIC INCLUSIONS Ph.D. Thesis [ZUR WIRKUNG VON HAFNIUM IN UNLEGIERTEN BAUSTAEHLEN AEHNLICH St 52-3, UNTER BESONDERER BERUECKSICHTIGUNG DES WARMUMFORMVERHALTENS DER SULFIDISCHEN EINSCHLUESSE]
Gert Jackel 21 Jun. 1973 175 p refs In GERMAN
Avail: NTIS HC $6.25

The effects of reaction products from hafnium additions on the hot forming-, crystallization-, and mechanical-properties of steels are studied by metallurgical and chemical analyses. It is shown that the alloying behavior of hafnium is determined by its affinity to oxygen, nitrogen, carbon and sulfur additives in steels. Denitriding effects of hafnium eliminate carbonitrides from the melt above the liquefaction temperature; desulfiding effects decrease elongation of sulfuric impurities markedly during hot forming and thus provide for improved deformation resistance. Transl. by G.G.

N75-12122# Defence Standards Labs., Maribyrnong (Australia).
CHROMATE PASSIVATION OF BRASS
G. O. Harris and L. F. G. Williams Aug. 1974 15 p refs
(TN-341) Avail: NTIS HC $3.25

The dimensional change resulting from immersion of brass in passivation solution over a wide range of immersion times and temperatures was of the order of 1 micron. The ammonium silver nitrate spot test had advantages over the selenious acid test as a test for the presence of the film. Author

N75-12123# Royal Aircraft Establishment, Farnborough (England).
HEAT RESISTANT TITANIUM ALLOYS. INTRODUCTION OF THE ALLOY UT 651A
L. Seraphin, R. Tricot, and R. Castro Oct. 1974 35 p refs Transl. into ENGLISH from Rev. Met. (Paris), v. 71, no. 1, 1974 p 19-36
(RAE-Lib-Trans-1790; BR44153) Avail: NTIS HC $3.75

After the metallurgical data specific to the heat resistant titanium alloys are reviewed, the essential design criteria which

govern their use in aircraft jet engines are presented. The main properties of a new alloy derived from 685, but having an improved quenchability, are given and compared with those of the original. The properties are such that the use of the materials for compressor disk can be considered. The alloy has the required properties in sections up to about 40mm thick after air quenching, and up to about 60mm after oil quenching. Author

N75-12124*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SURFACE RECRYSTALLIZATION THEORY OF THE WEAR OF COPPER IN LIQUID METHANE
Robert C. Bill and Donald W. Wisander Dec. 1974 26 p refs Prepared in cooperation with Army Air Mobility R and D Lab.
(NASA-TN-D-7840; E-7994) Avail: NTIS HC $3.75 CSCL 11/6

Copper was subjected to sliding against 440C in liquid methane. The normal load range was from 1/4 to 2 kilograms, and the sliding velocity range was from 3.1 to 25 meters per second. Over this range of experimental parameters, the wear rate of the copper rider was found to be proportional to the sliding velocity squared and to the normal load. Transmission electron microscopy was used to study the dislocation structure in the copper very near the wear scar surface. It was found that near the wear scar surface, the microstructure was characterized by a fine-cell recrystallized zone in which individual dislocations could be distinguished in the cell walls. The interiors of the cells, about 0.5 micrometer in diameter, were nearly dislocation free. Below the recrystallized layer was a zone that was intensely cold worked by the friction process. With increasing depth, this intensely cold worked zone gradually became indistinguishable from the partially cold worked bulk of the copper, representative of the initial condition of the material. Author

N75-12125# Royal Aircraft Establishment, Farnborough (England).
THE ALPHA-BETA TITANIUM ALLOYS. A COMPARISON OF THE HEAT TREATMENT AND PROPERTIES OF THE ALLOYS: Ti-6Al-4V, Ti-6Al-6V-2Sn AND Ti-6Al-6V-2Sn-6Zr
R. Molinier, L. Seraphin, R. Tricot, and R. Castro Oct. 1974 26 p refs Transl. into ENGLISH from Rev. de Metallurgie, (France), v. 71, no. 1, 1974 p 37-49
(RAE-Lib-Trans-1797; BR44131) Avail: NTIS HC $3.75

The heat treatment of the alpha-beta titanium alloys are discussed in terms of the behaviour of three such alloys, namely Ti-6Al-4V, Ti-6Al-6V-2Sn Ti-6Al-6V-2Sn-6Zr. The three alloys show, in the order given, an increasing susceptibility to hardening. In addition to annealing and the classical quench and age treatments, other new treatments which have been developed to improve certain important properties such as fatigue resistance or toughness (K sub Ic) are discussed. The 'slack quench' and age treatment give, for Ti-6Al-6V-2Sn and Ti-6Al-6V-2Sn-6Zr, a better compromise between the properties of strength, quenchability, and toughness. The tensile properties of the three alloys are given as a function of the section of the product; typical values of toughness and fatigue strength are given. Author

N75-12126# Research Inst. of National Defence, Stockholm (Sweden).
REPORT ON ATTENDANCE AT ARBEITSTAGUNG: GASE IN METALLEN AT DARMSTADT AND VISITS TO AUGUST-THYSSEN-HUTTE AG AT DUISBURG AND THE MAX PLANCK INSTITUTE AT STUTTGART, MARCH 1972 [RAPPORT FRAEN DELTAGANDE I ARBEITSTAGUNG: GASE IN METALLEN I DARMSTADT SAMT STUDIEBESOEK VID AUGUST-THYSSEN-HUTTE AG I DUISBURG OCH MAX PLANCK-INSTITUT I STUTTGART, MARS 1972]
Knut-Fredrik Alm Dec. 1972 12 p In SWEDISH
(FOA-4-C-4519-F3) Avail: NTIS HC $3.25

Questions of gases in metals and methods for their analytical determination are considered. A brief reference is given to the lectures at the Darmstadt Conference. Author

N75-12127*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
HARDNESS BEHAVIOR OF BINARY AND TERNARY NIOBIUM ALLOYS AT 77 AND 300 K
Joseph R. Stephens and Walter R. Witzke Washington Dec. 1974 16 p refs
(NASA-TN-D-7847; E-8083) Avail: NTIS HC $3.25 CSCL 11F

The effects of alloy additions of zirconium, hafnium, molybdenum, tungsten, rhenium, ruthenium, osmium, rhodium, and iridium on the hardness of niobium was determined. Both binary and ternary alloys were investigated by means of hardness tests at 77 K and 300 K. Results showed that atomic size misfit plays a dominant role in controlling hardness of binary niobium alloys. Alloy softening, which occurred at dilute solute additions, is most likely due to an extrinsic mechanism involving interaction between solute elements and interstitial impurities. Author

N75-12128*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EFFECT OF EXPOSURE CYCLE ON HOT SALT STRESS CORROSION OF A TITANIUM ALLOY
Hugh R. Gray and James R. Johnston Washington Dec. 1974 22 p refs
(NASA-TM-X-3145; E-8019) Avail: NTIS HC $3.25 CSCL 11F

The influence of exposure cycle on the hot-salt stress-corrosion cracking resistance of the Ti-8Al-1Mo-1V alloy was determined. Both temperature and stress were cycled simultaneously to simulate turbine-powered aircraft service cycles. Temperature and stress were also cycled independently to determine their individual effects. Substantial increases in crack threshold stresses were observed for cycles in which both temperature and stress or temperature alone were applied for 1 hour and removed for 3 hours. The crack threshold stresses for these cyclic exposures were twice those determined for continuous exposure for the same total time of 96 hours. Author

N75-12129# Research Inst. of National Defence, Sundbyberg (Sweden).
FIFTH INTERNATIONAL CONGRESS ON METAL CORROSION [FEMTE INTERNATIONELLA KONGRESSEN OEVER METALLERS KORROSION, TOKYO, 21-27 MAJ 1972]
Per Atterby Jan. 1973 17 p Partly in SWEDISH and partly in ENGLISH Presented in Tokyo, 21-27 May 1972
(FOA-1-C-1493-G3(G1)) Avail: NTIS HC $3.25

The fifth international Congress on metal corrosion was attended by about 560 scientists from 28 countries. The field of corrosion was divided into 15 different sections on which 214 papers were submitted. Electro-chemical research on deposit corrosion and pitting of low alloy steel in inhibited salt solutions was emphasized. Author

N75-12130# Commissariat a l'Energie Atomique, Bruyeres-le-Chatel (France).
STUDY OF PHASE TRANSFORMATIONS IN TITANIUM ALLOY. 3: STUDY OF ISOTHERMAL TRANSFORMATIONS OF BETA 3 TITANIUM ALLOY
F. Vial, C. Beauvais, J. P. Fidelle, and B. Hocheid May 1974 45 p refs In FRENCH
(CEA-R-4567) Avail: AEC Depository Libraries HC $5.25

The study of isothermal breakdown of Beta 3 titanium alloy (11.2% Mo-6.3% Zr-4.7% Sn) has allowed the drawing of TTT curves, after preheating at 850 C for 15 min. At this temperature, the alloy is made of two phases: Beta(0) (bcc) and delta (hcp). Beta(0) breakdown induces precipitation of alpha phase (H) above 450 C and of very fine omega phase particles below this temperature. Then during very long isothermal holdings, omega phase transforms to alpha. Author (NSA)

N75-12131# Commissariat a l'Energie Atomique, Bruyeres-le-Chatel (France).
PHASE TRANSFORMATIONS IN TITANIUM ALLOYS. 1. CONTRIBUTION TO STUDY OF TRANSFORMATION KINETICS IN Ti-6 PERCENT Al-6 PERCENT V-2 PERCENT Sn ALLOY
R. Klima, F. Quemper, C. Beauvais, C. Roux, M. Rapin, and B. Hocheid May 1974 65 p refs In FRENCH
(CEA-R-4542) Avail: AEC Depository Libraries HC $6.25

Studies performed on Ti 6% Al-6% V-2% Sn are introduced by a short presentation of a preliminary work on phase transformations in Ti 6% Al-4% V titanium alloy. Time-temperature-transformation curves about transformations of Ti 6% Al-6% V-2%

Sn show that above 700 C, beta (bcc) yields alpha (hcp) is the only active reaction. Alpha prime martensite appears below this temperature and until 600 C a double break down takes place: beta yields alpha and alpha prime yields alpha + beta. Below 600 C, alpha prime remains even after lengthened holdings. Below 500 C, a very important hardening is ascribed to omega phase precipitation. Systematic mechanical tests have established relationship between mechanical properties and the most characteristic microstructures. Author (NSA)

N75-12132# California Univ., Berkeley. Lawrence Berkeley Lab.
ANNEALING OF STACKING-FAULT TETRAHEDRA AND FRANK DISLOCATION LOOPS IN SILVER Ph.D. Thesis
T. Astrup May 1974 135 p refs
(Contract W-7405-eng-48)
(LBL-1172) Avail: NTIS HC $5.75

Observation of quenched-in stacking-fault tetrahedra (SFT) and frank dislocation loops in 99.999+% silver during annealing was made by hot stage transmission electron microscopy. The defects produced by quenching from a few degrees below the melting point, had a range of edge sizes L up to 2000A for the SFT, and from 650A to 1350A for the triangular loops. Shrinkage of loops taking place from one corner were detected. Existing theories concerning collapse and/or shrinkage of SFT and loops are reviewed and discussed. Calculations show that the quenched-in defects are in the expected size range. The ledge mechanisms are shown to be the mechanisms responsible for thermally activated shrinkage of SFT. The nucleation energy of a Shockley loop near a SFT-corner is found to be considerably less than that for the loop in the middle of the SFT-face. The influence of the anisotropy and the temperature on the stacking-fault energy is discussed, as well as the limitations in the energy calculations due to configurations of core dimensions.
Author (NSA)

N75-12133# California Univ., Berkeley. Lawrence Berkeley Lab.
STRUCTURE AND MECHANICAL PROPERTIES OF Cu-Mn-Al ALLOY M.S. Thesis
F. S. Mirmirani Apr. 1974 146 p refs
(Contract W-7405-eng-48)
(LBL-2598) Avail: NTIS HC $5.75

A Cu2.5Mn0.5Al alloy having the symmetrical composition near the center of the miscibility gap, was heat treated to produce spinodal structures with various wavelengths. Transmission electron microscopy and diffraction were used to study the spinodally decomposed microstructures to measure the wavelength, and the difference of the lattice parameters of the precipitating phases. The latter was also measured by X-ray diffraction. The microstructural changes upon ageing at different temperatures were correlated with hardness measurements. The latter were used because of the brittleness of the alloy. The Vickers hardness did not correlate well with wavelength and difference in lattice parameter changes as some theories predict, but appears to be controlled by the transformation within the binary rich phase at least up to the maximum in hardness. The rate of coarsening of the major phases (Cu3Al and Cu2MnAl) also appears to be modified by the presence of particles, since deviations from the classical coarsening rates were observed.
NSA

N75-12134# Oak Ridge Gaseous Diffusion Plant, Tenn.
APPLICATION OF EDDY CURRENTS TO DETECT CORROSION IN COPPER AND STAINLESS STEEL TUBING
J. H. Smith Jun. 1974 53 p refs
(Contract W-7405-eng-26)
(K-1860) Avail: NTIS HC $4.25

The ability of an eddy-current test to detect and evaluate corrosion in heat exchanger tubing is investigated. Two types of tubing are considered; a finned copper tubing used in a water-cooled Freon condenser and a straight-wall cylindrical stainless steel tubing used in a Freon-Freon heat exchanger. The resolution and sensitivity of these tests are determined and the testing techniques, instrumentation, and theory of the test are discussed. A relationship is shown between the eddy-current indications obtained from drilled through holes and indications obtained from corrosion pits. Author (NSA)

N75-12135# Naval Research Lab., Washington, D.C.
PREVENTION AND CONTROL OF SUBCRITICAL CRACK GROWTH IN HIGH-STRENGTH METALS Final Report
R. W. Judy, Jr. and R. J. Goode 2 Aug. 1974 15 p refs
(NRL Proj. M01-30; ZF54544002)
(AD-785233; NRL-7780) Avail: NTIS CSCL 11/6

The integrity of structures that must operate in hostile environments depends on both the resistance to the propagation of cracks and the resistance to fracture of the structural material. Design procedures established to assure structural integrity are intended to enable designers systematically to take account of applicable parameters and their relation to various structures. The three-part Ratio Analysis Diagram (RAD) system was developed to provide an analysis technique for ascertaining the significance of fracture, stress-corrosion cracking, and sustained-load cracking in terms of the relationships of critical stress level to flaw size. Author (GRA)

N75-12136# Naval Research Lab., Washington, D.C.
ACOUSTIC EMISSIONS AND STRESS-CORROSION CRACKING IN HIGH-STRENGTH ALLOYS Final Report
T. R. Tucker and C. T. Fujii Aug. 1974 15 p refs
(NRL Proj. 63M01-30; ZF54544002)
(AD-785009; NRL-MR-2879) Avail: NTIS CSCL 11/6

The usefulness of acoustic emission data (i.e., stress wave emission - SWE) to studies of stress-corrosion cracking (SCC) of high-strength alloys was explored. Single-edge-notched, precracked cantilever specimens were used to study the stress-corrosion-crack growth and SWE characteristics of a high-strength stainless steel and a titanium alloy. SWE data correlate reasonably well to crack growth measurements by conventional beam deflection techniques for high-strength stainless steel but is too insensitive for reliable detection of crack extension in the titanium alloy. The use of SWE data to define the energetics of discrete cracking events are currently beyond the capabilities of existing equipment and analytics.
Author (GRA)

N75-12137# Cornell Univ., Ithaca, N.Y. Materials Science Center.
A HIGH RESOLUTION ELECTRON MICROSCOPE STUDY OF THE OMEGA TRANSFORMATION IN Zr-Nb ALLOYS
Albert L. Chang, William Krakow, and Stephen L. Sass Aug. 1974 31 p refs
(Contract N00014-67-A-0077-0012; NR Proj. 031-734)
(AD-785267; MSC-2243; TR-10) Avail: NTIS CSCL 11/6

High resolution direct lattice imaging and dark field electron microscopy were used to examine the omega phase transformation in Zr-Nb alloys. In the low Nb content alloys dark field electron microscopy was used to show that the omega phase consists of large domains (100-200A in diameter) made up of small particles (3-6A in diameter). As the Nb content is increased the omega domains decrease in size until only 3-5A images are observed in alloys containing 15 wt. pct. Nb or more. The isolated particles are present over the range of composition from 8 to 30 wt. pct. Nb. Time sequence dark field micrographs taken at room temperature show that the omega domains in the low Nb alloys are changing with time. It is suggested that these observations indicate that fluctuations in structure between the beta and omega phases are occurring at room temperature. (Modified author abstract) GRA

N75-12138# National Bureau of Standards, Boulder, Colo. Cryogenics Div.
MATERIALS RESEARCH IN SUPPORT OF SUPERCONDUCTING MACHINERY Semiannual Report, 1 Sep. 1973 - 1 Mar. 1974
Mar. 1974 568 p refs
(ARPA Order 2569)
(AD-780596/3; NBSIR-74-359) Avail: NTIS HC $13.00 CSCL 11/6

Results of six months research are reported. Subjects include magneto-thermal conductivity, thermal conductivity, composites, elastic properties, fracture toughness, fatigue, and tensile. All measurements include the temperature range 4 to 300K. Materials examined are those being used in superconducting machinery or considered for use in future prototypes. Results show that the thermal conductivity in a magnetic field is lower than would

be predicted. A review of glass-reinforced composite behavior at low temperatures is included. The elastic moduli of engineering alloys from 4 to 300K are reported, and fracture toughness and fatigue crack growth rate data on AISI 304, AISI 316, A286, Ti-5Al-4V and Ti-6Al-2.5Sn at 4, 76, and 300K have been measured. Author (GRA)

N75-12139# Grumman Aircraft Engineering Corp., Bethpage, N.Y. Research Dept.
EFFECTS OF MICROSTRUCTURAL MODIFICATION ON TITANIUM TOUGHNESS AND FATIGUE
James Kennedy Aug. 1974 13 p refs
(AD-785409; RM-590) Avail: NTIS CSCL 11/6

Some effects of microstructure and chemical composition on the toughness and fatigue characteristics of titanium alloys after various heat treatments are described. The present studies were conducted on Ti-6Al-4V and Ti-6Al-6V-2Sn plate and forging in the mill annealed and recrystallized annealed conditions. It was generally observed that fracture toughness (K sub Ic) was improved by recrystallization annealing heat treatments and that lower alpha stabilizing contents (i.e., Al, O, N, C) and grain coarsening were associated with higher K sub Ic values. A similar trend for fatigue crack growth for these materials may have increased sensitivity to differences in microstructure and chemistry at low stress intensities during fatigue loading. (Modified author abstract) GRA

N75-12140# Stanford Univ., Calif. Center for Materials Research.
LONG RANGE MATERIALS RESEARCH Annual Technical Report, 1 Jul. 1973 - 30 Jun. 1974
Robert A. Huggins 30 Jun. 1974 180 p refs
(Contract DAHC15-73-G-15; ARPA Order 2470)
(AD-784962; CMR-74-6) Avail: NTIS CSCL 20/12

Contents: Generation of coherent vacuum ultraviolet and soft X-ray radiation; Detection of X-radiation; Superplasticity and warm working of plain high carbon steels; Superplasticity of Pb-Sn and Pb-Sn-Au alloys; Synthesis of new types of catalyst materials; Development of elevated temperatures electrocrystallization techniques. GRA

N75-12141# Naval Research Lab., Washington, D.C.
FRACTURE TOUGHNESS CHARACTERIZATION OF SHIPBUILDING STEELS Final Report
J. R. Hawthorne and F. J. Loss 10 Jul. 1974 47 p refs
(AD-785034; NRL-7701) Avail: NTIS CSCL 11/6

New fracture control guidelines for welded ship hulls have been proposed as a result of an investigation sponsored by the Ship Structure Committee of the Maritime Transportation Research Board. These guidelines include fracture toughness requirements in terms of the Drop Weight-NDT temperature Dynamic Tear (DT) energy. To aid the implementation of these criteria an exploratory program was undertaken to characterize the dynamic fracture toughness of ordinary-strength shipbuilding steels, namely, ABS Grades A, B, C, D, E, and CS. Test materials (plate) were obtained at random from several shipyards and steel mills in an effort to characterize the products of current steel making practice. Fracture toughness trends were defined by means of Drop Weight-NDT, 1-in. DT and standard Charpy V-notch tests and the observed toughness characteristics were compared with the proposed toughness criteria. (Modified author abstract) GRA

N75-12142# Martin Marietta Labs., Baltimore, Md.
OBSERVATIONS ON THE STRESS CORROSION CRACKING OF AN Al-5 PERCENT Zn-2.5 PERCENT Mg TERNARY AND VARIOUS QUARTERNARY ALLOYS
J. A. S. Green and W. G. Montague Aug. 1974 29 p refs
(Contract N00014-74-C-0277; NR Proj. 031-716)
(AD-785020; MML-TR-74-23C) Avail: NTIS CSCL 11/6

Studies were undertaken to test a concept of controlling stress-corrosion crack propagation in Al-Zn-Mg alloys through the use of minor alloying additions of elements known to retard hydrogen ion recombination such as Cd, As, Zr and Cr. Results indicated that the concept was invalid since the minor alloying additions themselves exerted a more profound influence on the grain boundary microstructure. Specifically, the microstructural features of grain boundary particle size and interparticle spacing were found to correlate with stress corrosion susceptibility. Auger electron spectroscope studies also revealed a correlation between the concentration of Zn and Mg within the precipitate-free zone and the susceptibility to cracking. (Modified author abstract) GRA

N75-12143# Westinghouse Astronuclear Lab., Pittsburgh, Pa.
MODIFICATION AND CONTROL OF OXIDES STRUCTURES ON METALS AND ALLOYS (PHASE 4) Final Report, 2 Mar. 1973 - 2 Mar. 1974
Robert C. Svedberg May 1974 161 p refs
(Contracts N62269-73-C-0361; N00019-70-C-0148)
(AD-785261; WANL-M-FR-74-003) Avail: NTIS CSCL 11/6

Nb-Co-Al and Nb-Fe-Al base alloys have been studied to determine the effects of composition both elemental and constituent (i.e., intermetallic alloy compounds used to make alloys) on the oxides formed during 1200C oxidation in air. Alloys were formed by both pressing and sintering of intermetallic compounds and elemental powders and by arc melting alloy buttons from intermetallic compounds and elements in powder form. Oxidation kinetics have been measured, and the oxides formed have been examined by X-ray diffraction techniques. In addition, Y and Y2O3 additions were made to several alloys to evaluate the effects of rare earth additions on the oxide structure. In addition to the oxidation kinetics and oxide structure correlation, metallographic techniques were used to evaluate the depth of penetration of oxygen into the various alloys. This study confirmed that rutile type oxides such as $NbAlO_4$, $NbFeO_4$, and $NbCrO_4$ are responsible for improved oxidation performance. Parabolic rate constants were measured for these alloys. (Modified author abstract) GRA

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N75-12144*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
MECHANICAL PROPERTIES OF SKYLAB THERMAL SHIELD MATERIALS AFTER PROLONGED ULTRAVIOLET IRRADIATION
Carl L. Haehner and Charles L. Staugaitis Washington Nov. 1974 13 p
(NASA-TN-D-7844; G-7506) Avail: NTIS HC $3.25 CSCL 11E

In response to an emergency request, the mechanical properties of two complex laminate materials, used as thermal shields on the Skylab spacecraft, were investigated. Concern over the prolonged use of these materials in the space environment prompted this investigation. Shields made of both of these materials, popularly called the parasol and the sail types, were taken to the Skylab spacecraft by the original Skylab astronauts. Both were used to restore thermal control after the original control surfaces were damaged during launch. During the tests the tensile properties were measured at anticipated service temperature and after prolonged exposure to increasing degrees of ultraviolet radiation at intensities approaching two solar constants. Some samples received exposures equivalent to 2,350 hours. The performance and degradation of the two materials are presented in terms of orientation, vacuum, and degree of irradiation. In general, the 75-micron (3-mil) parasol laminate showed a decrease in tensile properties as a function of exposure time, while the 200-micron (8-mil) sail laminate was little affected by exposure to the ultraviolet radiation. Author

N75-12145# Technische Universitaet, Hanover (West Germany).
ABSORPTION STUDIES WITH PENTANES FOR LABELING PORE STRUCTURE AND MATERIAL TRANSPORT IN POROUS SILICA Ph.D. Thesis [ADSORPTIONSUNTERSUCHUNGEN MIT PENTANEN ZUR KENNZEICHNUNG DER PORENTEXTUR UND DES STOFFTRANSPORTES IN POROESEM SILIKA]
Kurt Huebner 21 Aug. 1973 179 p refs In GERMAN
Avail: NTIS HC $7.00

Sorption velocity measurements are reported for n-pentane, neopentane and cyclopentane on porous Aerosil for the temperature region -10 to +50C. Measurement data are evaluated for the effective diffusion coefficients that cover the complete gas transport in relation to pore structure and surface activation energy. Transl. by G.G.

N75-12146# Technische Universitaet, Hanover (West Germany).
STRUCTURAL ANALYSIS ON SILICON AFTER IMPLANTATION OF CARBON IONS IN THE ENERGY REGION OF 1 TO 3 MeV Ph.D. Thesis [STRUKTURUNTERSUCHUNGEN AN SILIZIUM NACH IMPLANTATION MIT KOHLENSTOFF-IONEN IM ENERGIEBEREICH VON 1 BIS 3 MeV]
Karl Brack 21 Jun. 1973 185 p refs In GERMAN
Avail: NTIS HC $7.00

Crystallographic analysis on silicon crystal surface after implantation of high energy carbon ions followed by radiation hardening established no amorphous cluster formations. Recrystallization of the amorphous layer starts as an epitaxial growth process with maximum ion distribution below the recrystallization layer in a relatively undisturbed region. The 1 micro meter thick surface layer of the silicon crystal contains points defects in the lattice structure which are completely eliminated by irradiation at 700 C. Transl. by G.G.

N75-12147# Defence Standards Labs., Maribyrnong (Australia).
THE PAINTING OF MILITARY AIRCRAFT
L. A. Hill and F. Marson Aug. 1974 14 p
(DSL-TN-345) Avail: NTIS HC $3.25

The requirements of the coating system of a modern military aircraft are outlined, the surface to be protected are detailed and methods of surface pretreatment discussed. Corrosion problems are indicated. The types of paint used on aircraft and the appropriate specifications are considered. Local problems of refinishing are discussed. Author

N75-12148# Research Inst. of National Defence, Stockholm (Sweden).
PROPERTIES AND STRUCTURE OF SOME CERAMICS USED FOR, OR ADAPTED FOR, LIGHTWEIGHT ARMOUR [EGENSKAPER OCH STRUKTUR HOS NAGRA FOER LAETTVIKTSPANSAR ANVAENDA ELLER LAEMPADE KERAMER]
Fred Ortegren and Lars Ekbom Feb. 1973 14 p refs In SWEDISH
(FOA-4-C-4532-D6) Avail: NTIS HC $3.25

Comparisons of the properties and microstructures of some light weight armour, either using, or adapted for ceramics on aluminium oxide and boron carbide bases have been carried out. The comparisons comprise data obtained either from tests made by FOA or the manufacturer as well as current literature. The suitability of the material for use as a light weight armour is discussed. Author

N75-12149# Watervliet Arsenal, N.Y.
EFFECT OF LOADING RATE ON CRACK GROWTH IN GLASS-EPOXY SHEET
D. P. Kendall Aug. 1974 12 p refs
(DA Proj. 1F1-61102-A-35D)
(AD-785519; WVT-TR-74031) Avail: NTIS CSCL 11/4

The effect of loading rates ranging from 100 to 1,000,000 pounds per second on the crack growth resistance of multidirectional laminates of glass-epoxy has been determined. The results reported are the instantaneous stress intensity factors for crack extensions of 0.1 and 0.2 inches. A 60 per cent increase in crack growth resistance is obtained for a loading rate increase from 1,000 to 1,000,000 pounds per second. A modified strain compliance technique, based on the ratio of strain at a given point to the applied load, is used to obtain a measurement of crack extension under dynamic loading. Author (GRA)

N75-12150# Naval Research Lab., Washington, D.C.
PROPOSED METHOD AND DEVICE FOR OBTAINING PIEZOELECTRIC CONSTANTS OF CERAMIC CYLINDRICAL SHELLS Interim Report
Joseph F. Zalesak and Peter H. Rogers Aug. 1974 11 p refs
(NRL Proj. 81501-30; RR1310341)
(AD-785008; NRL-MR-2872) Avail: NTIS CSCL 14/2

The active elements of many Navy sonar sources and hydrophones consist of one or more electrostrictive cylindrical shells. The performance of these transducers depends on the values of the piezoelectric coefficients (g sub 31, g sub 33, d sub 31, d sub 33). A method is presented for rapidly determining the piezoelectric constants (d sub 31, d sub 33, g sub 31, g sub 33) of an unprepared cylindrical shell polarized radially, axially, or circumferentially. Design considerations for a device which implements this method are discussed. (Modified author abstract) GRA

N75-12151# Rensselaer Polytechnic Inst., Troy, N.Y. Materials Div.
STRENGTH AND DURABILITY OF A GLASS-CERAMIC CONTAINING SPODUMENE CRYSTALS
Robert H. Doremus and John F. Kay Jun. 1974 18 p refs
(Contract N00014-67-A-0117-0014)
(AD-783087/0) Avail: NTIS HC $3.25 CSCL 11/2

A glass-ceramic containing beta-spodumene crystals showed little decrease in fracture strength between liquid nitrogen temperature and room temperature. The strength was not reduced by water in the surrounding air. Its delayed failure was less than that of other glasses and crystalline ceramics. These results are attributed to the low reactivity of beta-spodumene crystals with water. Reasons for this lower reactivity are discussed in terms of the structure of the crystals. Author (GRA)

N75-12152# Army Materials and Mechanics Research Center, Watertown, Mass.
THERMAL AND ACOUSTIC FATIQUE OF CERAMICS AND THEIR EVALUATION Final Report, Jun. 1971 - Sep. 1973
Charles C. Seaton Jun. 1974 33 p refs
(ARPA Order 2181)
(AD-785547; AMMRC-MS-74-7) Avail: NTIS CSCL 11/2

A brief evaluation of the behavior of some important ceramic materials subjected to thermal and acoustic stress is presented. The criteria for evaluation included measurements of transverse rupture strength, elastic modulus, and internal friction. The chief emphasis is on a brief review of pertinent literature and techniques developed for performing such tests. Comments on the principal results of recent investigations are included. The problem of acoustic fatigue in ceramics was clearly demonstrated. This phenomenon may have important ramifications for the potential use of ceramics in acoustically active environments (e.g., gas turbine blades, bearings, and seals). Author (GRA)

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers, storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N75-12153# Defence Standards Labs., Maribyrnong (Australia).
KAMLETS TECHNIQUE FOR PREDICTING DETONATION VELOCITY AND PRESSURE
D. B. Stroud Jun. 1974 28 p refs
(Rept-594) Avail: NTIS HC $3.75

Kamlet's semiempirical technique for predicting detonation velocities and pressures, and the isentrope through the C-J point, was examined. It is shown by studying TNT/C and aluminized explosives that there are some explosives not discussed by Kamlet for which significantly less accurate predictions are obtained. Kamlet's technique was used,(1) to determine the effect on calculated detonation velocities and pressures of errors in the heat of formation of the explosive: (2) to predict the detonation velocity of NQ/TNT for comparison with a measured value, and (3) to predict the detonation velocity and pressure of various explosives of interest in Australia. A listing is given of a FORTRAN 4 code for evaluating Kamlet's formulae on the PDP/10 computer. Author

N75-12154# Research Inst. of National Defence, Sundbyberg (Sweden).
CATALYTIC BREAKDOWN OF HYDRAZINE [KATALYTISK

SOENDERDELNING AV HYDRAZIN]
Per Olof Granbom Nov. 1972 28 p refs In SWEDISH
(FOA-1-C-1488-D3) Avail: NTIS HC $3.75

A description of hydrazine technology is followed by a survey of research carried out on the different catalysing agents required to solve the kinetics and mechanisms for breaking down hydrazine. Some suggestions for the reaction mechanism have been given but the problem is as yet, not definitely solved. Among the catalysts, iridium is attracting most interest since it is the only spontaneous ignition catalyst for hydrazine that has been found. Due to the small availability of iridium on the world markets, such a catalyst would be expensive. Author

N75-12155# Defence Standards Labs., Maribyrnong (Australia).
FABRICATION AND PERFORMANCE ASSESSMENT OF SHAPED CHARGES
M. C. Chick and G. P. Briggs Jun. 1974 51 p refs
(DSL-546) Avail: NTIS HC $4.25

Techniques used at DSL for the fabrication and evaluation of shaped charges are described. An assessment of target damage is included, along with photographic observation of jet characteristics in air, measurements of jet velocity in targets and the assessment of spall from perforated targets. All techniques are illustrated by examples from 38 mm and 41 mm diameter charges. Author

N75-12156# Research Inst. of National Defence, Stockholm (Sweden).
OBSERVATIONS ON BLAST EXPLOSIONS AT MEDEO, USSR, 1966 [OBSERVATIONER VID SPRAENGNINGARNA I MEDEO, SOVJETUNIONEN 1966]
Astrid Rundkwist Jan. 1973 22 p Transl. into SWEDISH from Nutjnys Stati i Zametki (USSR) In SWEDISH
(FOA-4-C-4523-A1) Avail: NTIS HC $3.25

Two different blasting operations with 1700 and 3600 tons explosives, respectively, are reviewed, which were used in constructing a dam at Alma-Ata in the U.S.S.R. in 1966. The report describes how the explosives were positioned, the course of the explosion, the results and the seismic recordings. Author

N75-12157# Los Alamos Scientific Lab., N.Mex.
IMPROVED HOT-WIRE ELECTROEXPLOSIVE DEVICES
R. M. Joppa 1973 13 p refs Presented at 8th Symp. on Explosives and Pyrotechnics, Los Angeles, 5 Feb. 1974
(Contract W-7405-eng-36)
(LA-UR-74-743; Conf-740216-2) Avail: NTIS HC $3.25

Concepts for improving the initiation safety margins of hot-wire electro-explosive devices (EED) were tested. Concepts investigated were: (1) header configurations for eliminating pin-to-pin arcing, and improvement for heat dissipitation; (2) substitution of reacting metal bridgewires for conventional bridgewires to eliminate explosives from the EED; and (3) substitution of potassium hexanitro diphenyl amine for the primary explosives in EED. It is concluded that these concepts could result in EED with lowered electrostatic and electro-magnetic radiation susceptibility, without increase in normal firing energy. F.O.S.

N75-12158# Naval Weapons Center, China Lake, Calif.
A UNIFIED THEORY OF SOLID PROPELLANT IGNITION. PART 1: DEVELOPMENT OF MATHEMATICAL MODEL
H. H. Bradley, Jr. Aug. 1974 37 p
(AD-785231; NWC-TP-5618-Pt-1) Avail: NTIS CSCL 21/2

The governing equations of solid propellant ignition in one space dimension are derived from conservation and transport considerations. The resulting mathematical model contains as subcases the existing gas phase, solid phase, and surface ignition theories. More important, it allows the effect of the site of chemical reaction on the ignition transient to be examined with consistent and compatible boundary conditions. Surface regression and the first order effect of nonunity Lewis number are retained to allow examination of the effect of these phenomena which are often neglected. Several second order terms are dropped from the more general equations in the interest of mathematical tractability; these include variable specific heat and transport coefficients. Finally, the physical equations are transformed for computer coding. (Modified author abstract) GRA

N75-12159# Naval Weapons Center, China Lake, Calif.
A UNIFIED THEORY OF SOLID PROPELLANT IGNITION. PART 2: COMPUTER PROGRAM
H. H. Bradley, Jr. Aug. 1974 27 p
(AD-785232; NWC-TP-5618-Pt-2) Avail: NTIS CSCL 21/2

A computer code is presented for solving the equations of the unified solid propellant ignition theory reported in Part 1 of this series of reports. The computing algorithm is based upon a predictor-corrector version of the Crank-Nicholson implicit method applied to the system of parabolic partial differential equations. Coding is in FORTRAN 5 language. Use is made of PARAMETER statements to effect variable dimensions and of NAMELIST statements for convenience in data input. Internal subroutines are freely used to overcome increased computer times which attend the use of argument lists associated with external subprograms. Approximately twenty-three thousand decimal locations are required for the compiled program, not including plotting routines, which would be dependent upon a particular computer installation. Author (GRA)

N75-12160# Southwest Research Inst., San Antonio, Tex. Army Fuels and Lubricants Research Lab.
STORAGE STABILITY OF FEDERAL SPECIFICATION GASOLINES Final Report
J. N. Bowden Jul. 1974 21 p refs
(Contract DAAK02-73-C-0221)
(AD-784282; AFLRL-34) Avail: NTIS CSCL 21/4

Eight drum samples of gasoline from various petroleum companies and four drums of European gasolines were stored for six months in sealed drums under cover. Two of the gasolines were unleaded and six were low lead fuels. Analyses, bench and engine tests performed on these samples, prior to and after the storage period, indicated that gasolines meeting these federal specification requirements appear to have adequate storage stability for at least six months and probably for longer periods. Gasolines with high olefin content appear to have less storage stability than those with lower olefin content. The work indicates that, from the standpoint of storage stability, combat gasoline in the military system could be replaced with federal specification gasoline with no ill effects; however, a more severe oxidation stability requirement should be included in the Federal Specifications to insure adequate storage stability. (Modified author abstract) GRA

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N75-12161* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SYSTEM FOR DEPOSITING THIN FILMS Patent
Philip W. Tashbar, inventor (to NASA) Issued 12 Nov. 1974 6 p Filed 2 May 1973 Supersedes N73-23770 (11 - 14, p 1697)
(NASA-Case-MFS-20775-1; US-Patent-3,847,115; US-Patent-Appl-SN-356664; US-Patent-Class-118-49.1) Avail: US Patent Office CSCL 13H

A system for depositing a thin film of one material on another is described. A mass filter is interposed between the source of material being deposited and the object upon which deposition is being made. Official Gazette of the U.S. Patent Office

N75-12162*# National Aeronautics and Space Administration, Washington, D.C.
FABRICATION TECHNOLOGY: A COMPILATION Technology Utilization
Sep. 1974 25 p
(NASA-SP-5978(02)) Avail: NTIS HC $1.00 CSCL 13H

Devices and techniques are presented for cutting, shaping, and forming metals. Metal fabrication and coating techniques are discussed. Patent information is presented. Author

N75-12163# Atlantic Richfield Hanford Co., Richland, Wash.
GUIDE OF FIRE PROTECTION IN CAVES, CANYONS, AND HOT CELLS

H. A. Lee Jul. 1974 92 p refs
(Contract AT(45-1)-2130)
(ARH-3020) Avail: NTIS HC $4.75

The advent and growth of the nuclear industry have required the development of unique facilities for handling intensely radioactive materials. These facilities, characterized by exhaust ventilation filtration for containment and massive shielding or other means for prevention of excessive radiation exposure to operating personnel, are referred to as caves, canyons, and hot cells. The maintenance of total containment while handling radioactive materials in caves, canyons, and hot cells is difficult at best; a fire occurring in these facilities greatly increases the difficulty. This guide presents information intended to aid in preventing such fires or, in the event of their occurrence, assist in minimizing their harmful consequences. Author (NSA)

N75-12164# Sandia Labs., Livermore, Calif.
CHEMICAL MILLING
J. W. Dini May 1974 88 p refs
(Contract AT(29-1)-789)
(SLL-74-5001) Avail: NTIS HC $4.75

Chemical milling was used in removing excess material and reducing overall weight of metal parts. Chemical milling is discussed generally, describing the process, its applications, advantages and limitations, chemical milling solutions, maskants, and various other aspects of the chemical milling process. The effectiveness of chemical milling of specific materials such as aluminum, beryllium, magnesium, titanium, steel, and stainless steel alloys is considered. Various chemical milling solution formulations are presented and effects on such factors as mechanical and fatigue properties are considered. Author (NSA)

N75-12165# Kanner (Leo) Associates, Redwood City, Calif.
FIRE PROTECTION IN ELECTRONIC INSTALLATIONS
H. Buecher 1974 31 p refs Transl. into ENGLISH from the German Presented at the 4th Intern. Seminar on Fire Protection, Zurich, 1973 Sponsored by AEC Prepared for Los Alamos Sci. Lab.
(LA-tr-74-17; Conf-731068-3) Avail: NTIS HC $3.75

Fire prevention is discussed for electronic data processing and control centers. Topics discussed include: necessity for preventive measures, concepts for protection, causes of conflagration, examples of damage, and protection methods. F.O.S.

N75-12166# Battelle-Northwest, Richland, Wash. Pacific Labs.
RESEARCH IN THE PRODUCTION OF RARE-EARTH-COBALT PERMANENT MAGNET MATERIAL BY SPUTTER DEPOSITION Annual Technical Report, 15 Feb. 1973 - 15 Feb. 1974
Richard P. Allen, Shelly D. Dahlgren, and Hubert W. Arrowsmith May 1974 46 p refs
(Contract F33615-73-C-5012)
(AD-785358; AFML-TR-74-87) Avail: NTIS CSCL 11/6

Contents: Sputter deposition of rare-earth-cobalt alloys; Metallurgy of sputtered magnet material; Magnetic property studies - sputtered amorphous alloys, RCo5 alloys, R2(Co,Fe)17 alloys; Oxygen control studies; Preparation of EuCo5; Texture control studies; Substrate-deposit compatibility studies; Substrate removal studies; Sputtering system design considerations; Manufacturing process feasibility evaluation. GRA

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking*.

N75-12167 British Broadcasting Corp., Kingswood (England). Research Dept.
UHF TELEVISION: REQUIREMENTS FOR LONG-TERM AND SHORT-PERIOD CARRIER DRIVE FREQUENCY STABILITY
R. V. Harvey Sep. 1974 7 p refs
(BBC-RD-1974/33) Avail: BBC, Kingswood Warren, Tadworth, Surrey, England

The frequency stability required for the carrier drives of a group of co-channel television transmitters was examined theoretically. An upper limit was suggested for the permissible levels of long-term frequency drift and of frequency modulation uncorrelated with the video waveform. This takes into account both protection against co-channel interference and impairment of the received picture in the absence of interference. Also considered were the requirements of inter-carrier sound signals where the sound and vision carrier drives are separate. Results are given for both nominal and precision offset working. Author

N75-12168*# National Scientific Labs., Inc., McLean, Va.
AAFE MAN-MADE NOISE EXPERIMENT PROJECT. VOLUME 1: INTRODUCTION EXPERIMENT DEFINITION AND REQUIREMENTS Final Technical Report
Jun. 1974 28 p
(Contract NAS1-11465)
(NASA-CR-132509) Avail: NTIS HC $3.75 CSCL 17B

An experiment was conducted to measure and map the man-made radio frequency emanations which exist at earth orbital altitudes. The major objectives of the program are to develop a complete conceptual experiment and developmental hardware for the collection and processing of data required to produce meaningful statistics on man-made noise level variations as functions of time, frequency, and geographic location. A wide dispersion measurement receiver mounted in a spacecraft operating in a specialized orbit is used to obtain the data. A summary of the experiment designs goals and constraints is provided. The recommended orbit for the spacecraft is defined. The characteristics of the receiver and the antennas are analyzed. Author

N75-12169*# National Scientific Labs., Inc., McLean, Va.
AAFE MAN-MADE NOISE EXPERIMENT PROJECT. VOLUME 2: PROJECT AND EXPERIMENT DISCUSSIONS Final Technical Report
Jun. 1974 159 p
(Contract NAS1-11465)
(NASA-CR-132510) Avail: NTIS HC $6.25 CSCL 17B

An experiment for the acquisition and processing of man-made noise interference data on earth orbital altitudes is discussed. The objectives of the project are to confirm the results of analytical studies concerning radio frequency man-made noise in space. It is stated that the measurements of the amounts and types of noise in frequency bands of interest could allow the allocation and utilization of frequencies to be optimized and would also contribute to the engineering objective of optimizing flight receiving systems. A second objective of the project was to design and fabricate a noise measuring receiver which would demonstrate the feasibility of the experiment design under the project. The procedures for acquiring and processing the electromagnetic radiation data are discussed. Author

N75-12170*# National Scientific Labs., Inc., McLean, Va.
AAFE MAN-MADE NOISE EXPERIMENT PROJECT. VOLUME 3: APPENDICES Final Technical Report
Jun. 1974 107 p refs
(Contract NAS1-11465)
(NASA-CR-132511) Avail: NTIS HC $5.25 CSCL 17B

Management and operational considerations involved in the project to measure man-made electromagnetic noise at earth orbital altitudes are discussed. The subjects considered are: (1) launch and orbit of the Scout D vehicles, (2) experiment management, (3) receiver scanning considerations, (4) data handling, and (5) threshold measurements. The storage requirements for a high resolution, complete data storage library are defined. Mathematical models of signal detection probability are developed. Author

N75-12171*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
ERROR CONTROL IN THE GCF: AN INFORMATION-THEORETIC MODEL FOR ERROR ANALYSIS AND CODING
Oduoye Adeyemi 15 Oct. 1974 193 p refs
(Contract NAS7-100)
(NASA-CR-140852; JPL-TM-33-699) Avail: NTIS HC $7.00 CSCL 17B

The structure of data-transmission errors within the Ground Communications Facility is analyzed in order to provide error control (both forward error correction and feedback retransmission) for improved communication. Emphasis is placed on constructing a theoretical model of errors and obtaining from it all the relevant statistics for error control. No specific coding strategy is analyzed, but references to the significance of certain error pattern distributions, as predicted by the model, to error correction are made. Author

N75-12172*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
A SIMULATION OF SYNTHETIC APERTURE RADAR IMAGING OF OCEAN WAVES
Calvin T. Swift 29 Oct. 1974 14 p Presented at the 1974 USNC/URSI Meeting, Boulder, Colorado, 14-17 Oct. 1974
(NASA-TM-X-72629) Avail: NTIS HC $3.25 CSCL 17I

A simulation of radar imaging of ocean waves with synthetic aperture techniques is presented. The modelling is simplistic from the oceanographic and electromagnetic viewpoint in order to minimize the computational problems, yet reveal some of the physical problems associated with the imaging of moving ocean waves. The model assumes: (1) The radar illuminates a one-dimensional, one harmonic ocean wave. (2) The scattering is assumed to be governed by geometrical optics. (3) The radar is assumed to be down-looking, with Doppler processing (range processing is suppressed due to the one-dimensional nature of the problem). (4) The beamwidth of the antenna (or integration time) is assumed to be sufficiently narrow to restrict the specular points of the peaks and troughs of the wave. The results show that conventional processing of the image gives familiar results if the ocean waves are stationary. When the ocean wave dispersion relationship is satisfied, the image is smeared due to the motion of the specular points over the integration time. In effect, the image of the ocean is transferred to the near field of the synthetic aperture. Author

N75-12173# Lockheed Missiles and Space Co., Palo Alto, Calif.
HOMING, CHAPTER 6
1973 45 p refs Transl. into ENGLISH from the book "Osnovy Radioupravleniia" Moscow, Sovetskoe Radio, 1973 p 303-351
Avail: NTIS HC $3.75; National Translation Center, John Crerar Library, Chicago, Ill. 60616

Homing for atmospheric missiles is examined. Functional and block diagrams of radio engineering homing heads are presented along with sights of homing systems. The control loop of a homing missile, and natural interference in homing system radio channels are discussed. J.M.S.

N75-12174# Communications Research Centre, Ottawa (Ontario).
THE EFFECT OF PROTOCOL ON THE RESPONSE TIME OF LOOP STRUCTURES FOR DATA COMMUNICATIONS
T. G. Richardson Aug. 1974 24 p refs
(CRC-1261) Avail: NTIS HC $3.25

The loop or ring structure for data communications was considered under three different operating protocols. An inquiry-response type traffic pattern was assumed and response time was chosen as the measure of performance. Each loop protocol was analyzed through the use of approximate theoretical queueing formulae and these results were compared to those of a simulation. Conclusions were drawn as to the relative merits of the three alternatives. Mean response time was found to be about equal over the range of interest but important differences were observed in individual terminal behavior. Author

N75-12175# Research Inst. of National Defence, Stockholm (Sweden).
THE 7th URSI CONGRESS IN WARSAW, 1972 [SJUTTONDE URSI-KONGRESSEN, WARSZAWA 1973]
C. Aurell, A. Blomquist, F. Eklund, E. Kollberg, R. Lindquist, P.-O. Lundbom, G. Nillson, V. Scuka, and G. Svennerus Mar. 1973 52 p In SWEDISH
(FOA-3-C-3738-E8) Avail: NTIS HC $4.25

A brief account is given of the activities of the Union Radio Scientific International seventeenth general meeting in Warsaw, August 1972. The report mainly consists of a collection of the written papers used as a basis for a verbal report by the Swedish official delegates to the different commissions at USRI XVII plenary meeting before SNRV, at its session in Stockholm on 13 October, 1972. Topics cover: (1) radio measurements and standards; (2) radio and non-ionized media; (3) ionosphere; (4) magnetosphere; (5) radio astronomy; (6) radio waves and circuits; (7) radio electronics; and (8) radio noise of terrestrial origin. Transl. by G.G.

N75-12176# Research Inst. of National Defence, Stockholm (Sweden).
COMMUNICATION LINK WITH CO2 LASER [KOMMUNIKATIONSLAENK MED CO2-LASER]
Hans-Olof Lindstrand and Sten Nordlander Jan. 1973 13 p refs In SWEDISH
(FOA-2-C-2584-E2) Avail: NTIS HC $3.25

A communication link constructed around a CO2 laser, has been set up in a laboratory. Both transmitter and receiver have been placed in the FOA2 horizon room, with a reflector mounted on Kahnas tower. The measuring track was 2 x 1.6 km. Good communication for speech and music has been obtained. Author

N75-12177*# Magnavox Co., Torrance, Calif.
TDRSS TELECOMMUNICATIONS STUDY. PHASE 1 Final Report, Apr. - Aug. 1974
C. R. Cahn and R. S. Cnossen 15 Sep. 1974 537 p refs
(Contract NAS5-20047)
(NASA-CR-139157; R-4958) Avail: NTIS HC $12.50 CSCL 17B

A parametric analysis of the telecommunications support capability of the Tracking and Data Relay Satellite System (TDRSS) was performed. Emphasis was placed on maximizing support capability provided to the user while minimizing impact on the user spacecraft. This study evaluates the present TDRSS configuration as presented in the TDRSS Definition Phase Study Report, December 1973 to determine potential changes for improving the overall performance. In addition, it provides specifications of the user transponder equipment to be used in the TDRSS. Author

N75-12178# Civil Aeromedical Inst., Oklahoma City, Okla.
RECEPTION OF DISTORTED SPEECH
Jerry V. Tobias and F. Michael Irons Dec. 1973 12 p refs
(AD-777564; FAA-AM-73-13) Avail: NTIS HC $3.00

Noise, either in the form of masking or in the form of distortion products, interferes with speech intelligibility. When the signal-to-noise ratio is bad enough, articulation can drop to unacceptably-even dangerously-low levels. However, listeners are capable of learning to listen to such speech and to improve their comprehension of it. In the experiments described, the nature of this learning and the necessary amounts of time for maximum improvement are explored. The effects of several types of signal degradation are discussed, as are suggestions for training listeners to understand them. Among the processes investigated are the transfer of listening experience with one kind of signal to the analysis of another kind, the effects of actively participating in the listening task, and the results of manipulating motivation. Some inferences are drawn regarding speech learning by listeners with non-normal ears. Author

N75-12179# Sandia Labs., Albuquerque, N.Mex.
COMPARISON OF THE THEORETICAL ERRORS IN THE SIMULTANEOUS MEASUREMENT OF ROUND TRIP DELAY AND DOPPLER FREQUENCY FOR SEVERAL RADAR WAVEFORMS
D. A. Jelinek May 1974 50 p refs
(Contract AT(29-1)-789)
(SLA-74-30) Avail: NTIS HC $3.75

The position and velocity of an airborne missile can be determined by measuring the distance and rate of change of distance between the missile and several ground-based or airborne radars. The errors in the simultaneous measurement by a radar of the range and range rate depend on the radar's transmitted waveform. Expressions for these errors for a number of radar waveforms are derived assuming a matched-filter receiver, and a comparison of the errors is made. Among the waveforms considered there are: (1) a single pulse with no frequency

modulation, (2) a single pulse with linear frequency modulation, (3) a single pulse with V frequency modulation, (4) a single pulse with cosine frequency modulation, and (5) contiguous and non-contiguous repetitions of the preceding waveforms. The waveforms with the best theoretical accuracy were found to be the V frequency modulation and the cosine frequency modulation waveforms. Author

N75-12180# Commissariat a l'Energie Atomique, Grenoble (France).
SIGNAL PROCESSING
J. Max 1973 107 p In FRENCH Presented at the Conf. on Metrology in Fluid Mech., Ermenonville, France, 24 Sep. 1972
(CEA-Conf-2584) Avail: AEC Depository Libraries HC $8.50

Principles, method, and techniques used to transmit messages by signals are discussed. Special attention was given to estimation of errors, automatic correlation, and systematic and instrument errors. A schematic diagram is given of the process along with data on the use of the Fourier transform and various other mathematical procedures used to study signal processing. Transl. by E.H.W.

N75-12181# Sandia Labs., Albuquerque, N.Mex.
FIELD TESTING OF A SYSTEM FOR COMMUNICATION WITH COMMERCIAL SNM SHIPMENTS
T. A. Sellers, C. S. Sonnier, and J. M. DeMontmollin 20 Jun. 1974 18 p Presented at Ann. Meeting of the Am. Nucl. Soc., Philadelphia, 23 Jun. 1974 Sponsored by AEC
(SLA-74-5431; Conf-740608-11) Avail: NTIS HC $3.25

Tests with an experimental hf system simulating a portion of a nationwide communication system being developed for transportation safeguards demonstrated that hf transmission of short digital messages can be both operationally simple and highly reliable. To obtain those objectives it is necessary to incorporate both frequency and space diversity, and, less important, repetitive transmissions. If message traffic is limited to short digital messages at a low duty cycle, automatic switching and controls can be employed to obtain high reliability without compromising operational simplicity. Detailed engineering design is now underway to provide a fully operational system in FY 1975. Author (NSA)

N75-12182# Test Group (6585th), Holloman AFB, N.Mex.
RADAR SIGNATURE MEASUREMENTS OF BQM-34A AND BQM-34F TARGET DRONES, VOLUME 1A Final Report
Jan. 1974 270 p
(AD-785219; AFSWC-TR-74-01-Vol-1A) Avail: NTIS CSCL 17/9

Monostatic measurements of the components of the target scattering matrix, monostatic and 30 degree bistatic measurements of target glint, as well as 10 and 20 degree bistatic measurements of target cross section were performed using vertical and horizontal antenna polarizations. Data were obtained from both the principal and crossed polarized components of the target return. Sixteen orientations of each vehicle were measured at a frequency of 5500 MHz. This report is published in three parts, each of which presents data acquired from both BQM-34 vehicles. Part A is limited to monostatic radar cross section and glint data. Part B presents radar cross section data acquired at bistatic angles of 10 and 20 degrees. Radar cross section and glint data acquired at a bistatic angle of 30 degrees are contained in Part C. (Modified author abstract) GRA

N75-12183# Lincoln Lab., Mass. Inst. of Tech., Lexington.
THE DESIGN OF MULTIPLE ACCESS FREQUENCY HOPPING PATTERNS
Russell M. Mersereau and Thomas S. Seay 6 Sep. 1974 39 p refs
(Contract F19628-73-C-0002; AF Proj. 649L)
(AD-785381; TN-1974-32; ESD-TR-74-279) Avail: NTIS CSCL 17/2

A technique is discussed for the design of multiple access frequency hopping patterns which will allow a number of users to communicate reliability over a limited bandwidth in the presence of doppler and timing asynchronies. The patterns are based on a subset of the Reed-Solomon codewords. They possess nearly flat ambiguity and cross-ambiguity functions and thus could be useful as discrete radar signals. In addition the structure of the patterns permits a straightforward implementation. Author (GRA)

N75-12184# Purdue Univ., Lafayette, Ind.
SOME NEW ALGORITHMS FOR DETERMINISTIC AND PROBABILISTIC COMMUNICATION NETWORKS
P. M. Lin, B. J. Leon, T. C. Huang, and R. Krzyzanowski Jun. 1974 92 p refs
(Contract F30602-72-C-0438)
(AD-785119; RADC-TR-74-150) Avail: NTIS CSCL 17/2

The objective of the effort reported herein is twofold: to develop more efficient algorithms for communication networks and to implement the algorithms. Two problems are included: the maximum flow problem and the terminal-pair reliability problem. For the maximum flow problem, a new labeling algorithm has been proposed. A complete documentation of the computer program is included. Author (GRA)

N75-12185# Naval Undersea Center, San Diego, Calif.
LIMITING STATISTICS OF FIXED-POINT MULTIPLICATION ERRORS IN DIGITAL FILTERS WITH COEFFICIENTS OF ARBITRARY WORD LENGTH Research and Development Report, Jul. 1972 - Jun. 1973
L. P. Mulcahy Jul. 1974 33 p refs
(ZR0210501)
(AD-784982; NUC-TP-413) Avail: NTIS CSCL 09/4

A fixed-point multiplication error model is shown to exist for certain conditions on the multiplier input. This model can be used in the analysis of digital filters as used for signal processing in U.S. Navy sonar and radar equipment. GRA

N75-12186# Southeastern Massachusetts Univ., North Dartmouth. Dept. of Electrical Engineering.
PREPROCESSING AND FEATURE EXTRACTION FOR AUTOMATIC RECOGNITION OF RADAR IMAGES
C. H. Chen 9 Jul. 1974 8 p refs
(Grant AF-AFOSR-2119-71; AF Proj. 9769)
(AD-785427; AFOSR-74-1415TR) Avail: NTIS CSCL 17/9

This paper reviews the problem areas in the automatic recognition of radar images. Emphasis is placed on the preprocessing and feature extraction which are key to provide computationally efficient image recognition. Author (GRA)

N75-12187# Environmental Research Inst. of Michigan, Ann Arbor.
SAR IMAGE QUALITY ANALYSIS MODEL, VOLUME 2 Final Report, 1 Jul. 1972 - 31 Aug. 1973
Ralph H. Mitchell May 1974 184 p
(Contract F33615-72-C-1996; AF Proj. 698DF)
(AD-785398; ERIM-193900-10-F-Vol-2;
AFAL-TR-74-114-Vol-2) Avail: NTIS CSCL 17/9

The report describes a SAR (Synthetic Aperture Radar) image quality analysis and an image quality model incorporating the conclusions of the image quality analysis into a SAR system digital simulation. The objective of the model and its development program is to provide a fundamental approach for SAR image quality effects for specific SAR systems (parameter combinations performing specific missions). The model thus provides a relatively economical prediction of the information which can be extracted from a specified radar-mission configuration. The model output is a collection of image quality assessment functions, in particular the TQF (Threshold Quality Factor). Other parameters, which indicate the performance of the SAR system, are available from the digital simulation. These include the point target response (both range and azimuth) along with their locations for a preselected target field configuration. Author (GRA)

N75-12188# Adaptronics, Inc., McLean, Va.
REFRACTIVE INDEX MEASUREMENTS BY ADAPTIVE TECHNIQUES (RIMDAPT: PHASES 1 AND 1A) Final Report
Florence W. VanStraten, Roger L. Barron, and Richard F. Snyder 30 Jun. 1974 121 p refs
(Contract N00014-73-C-0103; NR Proj. 211-159)
(AD-785080; Rept-673-FTR) Avail: NTIS CSCL 20/14

A method for the adaptive computation of ray traces directly without going through the intermediate step of determining refractive indices or refractive index gradients is demonstrated.

The basis of the new method of direct ray tracing is presented together with an exposition of the inherent difficulty of using measured or computed refractive index or refractive index gradients for ray tracing purposes. Author (GRA)

N75-12189# Lexington Labs., Inc., Cambridge, Mass.
A LOW-SIDELORE ANTENNA-RADOME STUDY AT Ka-BAND
Joseph T. Mayhan and Alan J. Simmons 27 Jun. 1974 74 p refs
(Contract F19628-73-C-0002: AF Proj. 1508A)
(AD-785138; TN-1974-35; ESD-TR-74-227) Avail: NTIS CSCL 09/1

The technical report summarizes the results of extensive measurements designed to evaluate the effects of a homogeneous, spherical, glass (Pyrex) radome on the sidelope structure of an isolated, low-sidelobe antenna. The antenna-radome combination is intended for use on a submarine for satellite communication. The results are divided into three basic categories: first, the performance of an optimum low-sidelobe antenna is discussed; second, the measured and calculated performance of various candidate antennas without radome will be presented; finally, the effects of the spherical radome on the radiation patterns of the isolated antennas will be considered. Both lens and paraboloidal dish antennas are considered. The results of the measurements show that with the lens-radome combination low sidelobes can be achieved, whereas the dish-radome design presents considerable difficulties in achieving a low-sidelope pattern. Author (GRA)

N75-12190# Naval Research Lab., Washington, D.C.
REVIEW OF CURRENT RADAR INTERESTS AND EXTENDING THE RADAR SPECTRUM TO THE HF AND THE MILIMETER WAVE BANDS Final Report
Merrill I. Skolnik Aug. 1974 17 p refs
(AD-785007; NRL-MR-2869) Avail: NTIS CSCL 17/9

The report consists of two papers that are concerned with current radar interests. In one paper the various major applications are described and a listing of current problem areas is given. The other paper discusses the extension of radar outside the normal microwave bands to include the HF region at one end of the spectrum and millimeter waves at the other end. Author (GRA)

N75-12191# Georgia Inst. of Tech., Atlanta.
ADAPTIVE DIFFERENTIAL PCM SPEECH TRANSMISSION Final Report
T. P. Barnwell, A. M. Bush, J. B. ONeal, and R. W. Stroh Jul. 1974 204 p refs Prepared in cooperation with North Carolina State Univ., Raleigh
(Contract F30602-72-C-0481)
(AD-785124; RADC-TR-74-177) Avail: NTIS CSCL 17/2

Because of the preponderance of long distance calls in the Defense Communication System, a significant tradeoff exists between the transmission cost of a digital speech channel and the terminal (or processing) cost required to translate speech into digital form. Preliminary cost estimates have indicated a significant overall system savings will occur even if relatively expensive terminals are employed provided the digital speech channel rate can be reduced from the conventional 64 kBps (PCM) to 10 kBps. This study is devoted to analyzing the potential of adaptive differential PCM techniques for reducing the bit rate to the 10 kBps range. It examines ADPCM in which only the quantizer is adapted, both theoretically and via simulation. In addition, ADPCM in which both the quantizer and the predictor operate adaptively is investigated, with emphasis on simple systems rather than on LPC class systems. (Modified author abstract) GRA

N75-12761* National Center for Atmospheric Research, Boulder, Colo. National Scientific Balloon Facility.
NCAR TELEMETRY AND COMMAND SYSTEM
W. Jack Snider *In* NASA. Ames Res. Center Telescope Systems for Balloon-Borne Res. Nov. 1974 p 294-298 (For availability see N75-12735 03-74)
CSCL 09F

N75-12700 Communications Research Centre, Ottawa (Ontario).
SYSTEMS APPLICATIONS AND IMPLEMENTATION 1: COMMUNICATIONS
D. B. Wohlberg *In its* Proc. of the Can. Workshop on Acoustic Surface Waves Jun. 1974 11 p (For availability see N75-12696 03-70)

N75-12701 Communications Research Centre, Ottawa (Ontario).
SYSTEMS APPLICATIONS AND IMPLEMENTATION 2: RADAR
S. M. Chow *In its* Proc. of the Can. Workshop on Acoustic Surface Waves Jun. 1974 8 p (For availability see N75-12696 03-70)

N75-12762* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
AIROSCOPE TELEMETRY SYSTEM
Kenneth J. Pitts *In its* Telescope Systems for Balloon-Borne Res. Nov. 1974 p 299-308 refs (For availability see N75-12735 03-74)
CSCL 09F

N75-12763* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
AIROSCOPE COMMAND SYSTEM
W. Barrows *In its* Telescope Systems for Balloon-Borne Res. Nov. 1974 p 309-318 (For availability see N75-12735 03-74)
CSCL 09F

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics*.

N75-12192 Lignes Telegraphiques et Telephoniques, Conflans-Sainte-Honorine (France).
TRANSMISSION MODELS FOR MICROWAVE MICROELECTRONICS USING THIN FILMS ON FERRIMAGNETIC SUBSTRATES [MODELES DE TRANSMISSION EN COUCHES MINCES SUR SUBSTRAT FERRIMAGNETIQUE POUR LA MICROELECTRONIQUE HYPERFREQUENCE]
B. Chiron, J. L. Maldant, D. Tocanne, and M. DeVecchis Apr. 1973 77 p refs In FRENCH; ENGLISH summary
(Contract DGRST-71-7-2974)
(Rept-1230/73-143) Avail: Issuing Activity

The determination of microstrip line parameters using ferrite or garnet substrates is presented. The influence of line geometry and dc applied electric field were investigated with regard to characteristic impedance, wavelength, and losses. Special emphasis was laid on magnetic permeability aspects with respect to saturated or desaturated ferrites, internal field, and demagnetizing factors. The use of Fourier and Fourier sine transforms was found useful for numerically integrating Maxwell equations in the general tensorial case for magnetic permeability. Results are presented in self-contained graphical form. ESRO

N75-12193 Laboratoire Central de Recherches Thomson-CSF, Orsay (France).
ACTIVE CIRCUITS FOR INTEGRATED OPTICS. STUDY OF A TRANSVERSE ELECTRO-OPTICAL EFFECT MODULATOR [CIRCUITS ACTIFS POUR L'OPTIQUE INTEGREE ETUDE D'UN MODULATEUR A EFFET ELECTRONIQUE TRANSVERSAL]
D. B. Ostrowsky and M. Papuchon Jul. 1973 106 p refs In FRENCH
(Contract DGRST-72-7-0086)
(LCR-73-133/R/G.5) Avail: Issuing Activity

The theory and experimentation required to study electro-optical materials used in thin films with a view to building an integrated phase modulator are presented. The phenomena of guided propagation in structures with discontinuous or continuous

refractivity variation, together with the electro-optical effect and phase modulation in the geometry of integrated optics, are detailed. Monocrystalline films of ZnO on alumina substrate were successfully produced by vapor phase heteroepitaxy. As a next step, waveguides of resistivity between one and 100 Mohms-cm are being comtemplated by lithium diffusion. Good waveguides were produced with an attenuation of one db/cm by superficial exodiffusion of lithium in lithium niobate. A set-up was made to measure refractive index and surface gradient in these structures. ESRO

N75-12194 Laboratoire Central de Recherches Thomson-CSF, Orsay (France).
CHARACTERIZATION AND EVALUATION OF MATERIALS FOR MAGNETIC DOMAIN PROPAGATION (ORTHOFERRITES, GARNETS) Final Report [ETUDE DES CARACTERISTIQUES ET D'EVALUATION D'EMPLOI DES MATERIAUX ADAPTES A LA PROPAGATION DES DOMAINES MAGNETIQUES (ORTHOFERRITES, GRENATS) COMPTE RENDU DE FIN DE CONTRAT]
M. TranVanKai Dec. 1972 120 p refs In FRENCH
(Contract DGRST-71-7-2670)
(Rept-8562) Avail: Issuing Activity

The technology and experimental measurements required for the characterization of materials used in magnetic bubbles propagation are presented. The fundamentals of magnetic bubble generation and propagation are recalled. The technologies of generators, annihilation, and circulators using permalloy printed circuits are detailed. Control and command techniques with regard to bubble detection and switching are discussed. Temperature effects and interaction between bubbles and permalloy are dealt with in regard to studies on bubble mobility and defectoscopy. ESRO

N75-12195*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
DEPLOY/RELEASE SYSTEM Patent Application
David B. Robelen, inventor (to NASA) Filed 27 Nov. 1974 12 p
(NASA-Case-LAR-11575-1; US-Patent-Appl-SN-527727) Avail: NTIS HC $3.25 CSCL 09C

An apparatus is described for arresting uncontrollable motions of model aircraft. A remotely transmitted signal is used to deploy a parachute and after the model aircraft motions are stabilized, a second signal is transmitted which jettisons the parachute and normal flight resumed. The deploy and jettison signals may be sent using a single channel of a multi-channel transmitter and are completely independent of each other. NASA

N75-12196# Royal Aircraft Establishment, Farnborough (England).
CONTROL OF A TRANSISTOR SWITCH BY CURRENT TRANSFORMER
H. Cammas, J. C. Marpinard, R. Prajoux, and Y. Quemener Jun. 1974 17 p refs Transl. into ENGLISH from paper read at the LAAS Conf. on Elec. Propulsion in its Space Appl., Toulouse, 1972
(RAE-Lib-Trans-1774; BR42366) Avail: NTIS

The regulation devices used in flight power conditioning systems, particularly those required for electric thruster supplies usually work by switching to increase their efficiency and reduce their mass. The switching component is usually a transistor working as a switch. A transistor switch control system will be described using a current transformer and it will be shown that it offers particular advantages notably for flight uses. Indeed the reduction of the mass of flight regulators requires an increase in operating frequency of the switching devices which places extra constraints on the control of switches if an efficiency penalty is not desired and if a reliability consistent with the proposed mission life for communication satellites is to be achieved. Author

N75-12197# Technische Universitaet, Munich (West Germany).
INHOMOGENEOUS OIL SPARK PATHS AT UNIPOLAR VOLTAGE LOAD Ph.D. Thesis [INHOMOGENE OELFUNKENSTRECKIEN BEI UNIPOLARERSPANNUNGSBEANSPRUCHUNG]
Horst Geyer 16 Oct. 1973 276 p refs In GERMAN
Avail: NTIS HC $8.75

Electrical resistance and impulse transmission in insulating oil for direct current transmission are studied. Volt-ampere characteristics, electrode shape, voltage polarity, as well as instabilities caused by changes in impulse shape are used to determine the limitations on insulation behavior for oil spark paths. Transl. by G.G.

N75-12198*# Auburn Univ., Ala. Telemetry Systems Lab.
ANALYSIS OF AN IMPULSE NOISE SUPPRESSOR FOR FM DEMODULATORS Final Report
Sidney N. James 1 Jun. 1974 39 p refs
(Contract NAS8-20765)
(NASA-CR-120492) Avail: NTIS HC $3.75 CSCL 09C

An FM click noise suppressor was evaluated by means of several experimental tests conducted to verify previous test results. The range and worst case type of operation for the suppressor were also determined. A brief theoretical justification for the existence of FM click noise near threshold conditions is presented. It is concluded that the circuit does perform click suppression, but over a limited range. Suggestions for improvement of the circuit are given. N.R.

N75-12199*# Avco Government Products Group, Lowell, Mass. Systems Div.
HIGH POWER ac/dc VARIABLE R DYNAMIC ELECTRICAL LOAD SIMULATOR Final Report, 28 Jun. 1973 - 18 Oct. 1974
K. P. Joncas 18 Oct. 1974 86 p refs
(Contract NAS9-13524)
(NASA-CR-140331; AVSD-0292-74-RR) Avail: NTIS HC $4.75 CSCL 09C

A study program was undertaken to investigate various concepts and techniques for identifying and simulating both the steady-state and dynamic characteristics of electrical loads for use during integrated system test and evaluation. The development of hardware capable of providing the simulation capability is discussed. A general purpose simulator was developed with the capability of realizing a variety of models where element values were discretely variable. The different models, each corresponding to real spacecraft equipment, are set up manually for each case by suitable switching and patching. The models are capable of duplicating the dynamic and steady-state response of real loads at full power. Author

N75-12200*# National Aeronautics and Space Administration, Washington, D.C.
ELECTRONIC EQUIPMENT, SYSTEMS, AND TECHNIQUES: A COMPILATION Technology Utilization
[1974] 31 p
(NASA-SP-5972(01)) Avail: NTIS HC $1.00 CSCL 09C

Electronic circuits with specialized computer applications and control circuits are presented. Patent information is included. Author

N75-12201*# Ohio State Univ., Columbus. ElectroScience Lab.
ANALYSIS OF STRIP ANTENNAS IN THE PRESENCE OF A DIELECTRIC INHOMOGENEITY
Edward H. Newman Oct. 1974 65 p refs
(Grant NGL-36-003-138)
(NASA-CR-140854; TR-2902-20) Avail: NTIS HC $4.25 CSCL 09E

Moment method solutions are considered for treating the problem of wire antennas in the presence of an arbitrary dielectric inhomogeneity. In the first method, the current on the wire and the electric field intensity in the inhomogeneity are treated as independent unknowns, while in the second and third methods they are treated as dependent unknowns. The third method is applied to the problem of strip antennas in an electrically thin dielectric slab. Numerical results are presented, and are in good agreement with measurements and previous calculations. Author

N75-12202# Lockheed Missiles and Space Co., Palo Alto, Calif.
ANTENNAS WITH CONTROLLED POSITION OF THE DIRECTIVITY PATTERN IN SPACE (SCANNING ANTENNAS), CHAPTER 2

M. S. Zhuk and Iu. B. Molochkov 1973 43 p refs Transl. into ENGLISH from the book "Proektirovanie Linzovyk, Skanir-uiushchik, Shirokodiapazonnykh Antenn i Fidernykh Ustroistv" Moscow, Energiia, 1973 p 69-122
Avail: NTIS HC $3.75; National Translation Center, John Crerar Library, Chicago, Ill. 60616

The design and construction of antenna arrays using electromechanical methods of changing electrical parameters of some system element are discussed. The most essential advantage of antennas with electromechanical scanning is a lesser mass of moving parts. These antennas are considerably simpler than phased arrays and can satisfy many modern demands completely. A developed and sufficiently strict classification of scanning antennas does not yet exist. The separation in this study is according to the basic element assuring directivity pattern formation. Author

N75-12203# Lockheed Missiles and Space Co., Palo Alto, Calif.
FILTERS FOR OSCILLATIONS OF COMPEX SHAPE USING VARISTORS AND VARICAPS
V. F. Kushnir, V. A. Zaitsev, and M. I. Gadzhiev 6 Mar. 1974 5 p refs Transl. into ENGLISH from Izv. Kysshikh Uchebn. Zavedenii, Priborostr. (Leningrad), v. 17, no. 9, 1974 p 94-98
Avail: NTIS HC $3.25; National Translation Center, John Crerar Library, Chicago, Ill. 60616

A class of linear filters with variable parameters, adequate to oscillations of complex shape, was proposed. These filters, called structural-signal parametric filters (SSPF), correspond to the generalized resonance condition and permit filtration of oscillations according to shape. The realization of SSPF with an LC-element basis was considered and slight attention was paid to the realization of SSPF based on a parametric RC-basis. Meanwhile, it is difficult to select nonlinear inductances and capacitances with identical characteristics when realizing the considered filters using the LC-parametric elements. In addition, the use of inductances is undesirable when microminiaturizing apparatus. The principles for realizing SSPF to generate and filter oscillations of arbitrary shape on active parametric RC-filters are examined. The RC-circuit is taken as the initial circuit.
Author

N75-12204# Joint Publications Research Service, Arlington, Va.
DIRECTIVITY OF HYDROACOUSTIC ANTENNAS
M. D. Smaryshev 29 Nov. 1974 287 p refs Transl. into ENGLISH of the book "Napravlennost' gidroakusticheskikh antenn" Leningrad, Izdatel'stvo Sudostroyeniye, 1973 p 3-278
(JPRS-63554) Avail: NTIS HC $8.75

The basic parameters that characterize the direction properties of hydroacoustic antennas are defined and methods of calculating them are described. The most common types of antennas (linear, surface, three dimensional, reflector, and horn antennas are examined. Equations for determining the basic parameters of the antennas are presented. Exact methods of calculation, requiring the use of electronic digital computers, and approximate methods are discussed. An approximate method of determining the influence of random excitation errors on the directional characteristics and load factor of multielement hydroacoustic antennas is also described. Author

N75-12205# Massachusetts Inst. of Tech., Cambridge. Fluid Mechanics Lab.
A MODEL FOR THE ELECTROSTATIC CHARGING PROCESS IN FUEL FILTRATION
Peter W. Huber and Ain A. Sonin Jul. 1974 51 p refs
(Grant NSF GK-35798X)
(Publ-74-4) Avail: NTIS HC $4.25

The charge generation process in fuel filtration was analyzed in terms of an electrokinetic model, and theoretical results were obtained for the streaming current and potential in terms of fluid properties, bulk filter characteristics, flow conditions, and a fixed charge density which is a physicochemical property of the filter/fluid interface. Experiments with doped n-heptane passed through millipore filters support the theoretical model. Author

N75-12206# Research Inst. of National Defence, Stockholm (Sweden).
INACCURACY IN MEASUREMENTS AND CALIBRATIONS
R. Lennart Olsson Jan. 1973 24 p
(FOA-3-C-3734-E8) Avail: NTIS HC $3.25

Research Institute of Swedish National Defence (FOA) estimates of inaccuracies for the present calibration and measurement capabilities for radio-electric quantities are presented by accuracy charts. The charts must be considered as provisional, giving a rough indication of the state of the art at FOA. Author

N75-12207# Research Inst. of National Defence, Stockholm (Sweden).
EXPERIMENTS ON CONVENTIONAL EXCESS VOLTAGE TRANSIENT PROTECTION AS A PROTECTION AGAINST AN EMP TRANSIENT [UNDERSOEKNING AV KONVENTIONELLA OEVERSPAENNINGSTRANSIENTSKYDD SOM SKYDD MOTEN EMP-TRANSIENT]
Kenneth Daxberg Feb. 1973 18 p refs In SWEDISH
(FOA-4-C-4526-A3) Avail: NTIS HC $3.25

A discussion is given of the problem of whether a conventional over-voltage protection has any protecting effect against an over-voltage transient with a small rise time. The equipment tested were ASEA's protector type HHF and Siemens type K1-D1a. Also studied was the influence of the connections to and from the equipment as regards the effectiveness of the protector. The experiments show that the equipment used was very good for limiting an EMP transient. As regards the connections to and from the equipment, these should be reduced to minimum length to achieve the desired protection. Author

N75-12208*# Hughes Aircraft Co., Culver City, Calif. Aerospace Groups.
DEVELOPMENT FOR APPLICATION OF PARYLENE COATINGS Final Report, 1 Jul. 1973 - 15 Jun. 1974
F. W. Oberin Jun. 1974 111 p
(Contract NAS8-29940)
(NASA-CR-120536; P74-289) Avail: NTIS HC $5.25 CSCL 09C

A practical method of applying a parylene (paraxylene) coating to hybrid microcircuit devices was developed for the prevention of circuit malfunctions existing prior to package sealing or formed upon exposure to the service environment. It was found that paralene and an associated primer (if used) had generally little or no adverse effect on the active and passive elements of typical hybrid microcircuits. Exceptions were related to high frequency circuitry, low resistivity thick film resistors, and highly sensitive PIN diodes. Advantages of the use of the coating included increased dielectric strength and increased interconnection bond strength. Coating service life in nitrogen or nitrogen with low levels of oxygen as a contaminant is shown to be in excess of 1000 hours at 150 C and can be projected to be in excess of 5000 hours at 125 C. Author

N75-12209*# Ohio Univ., Athens. Dept. of Electrical Engineering.
GANGED SERIES POTENTIOMETER MIXER NETWORKS
Ralph W. Burhans Dec. 1974 5 p
(Grant NGR-36-009-017)
(NASA-CR-140850; TM-16) Avail: NTIS HC $3.25 CSCL 09A

A ganged potentiometer with the interesting property of a constant 10k ohm or greater series impedance for all rotations of the shaft was rediscovered. The device provided a versatile passive mixer circuit when used with most signal sources and can be used as a variable series input summing resistor in operational amplifier networks. The potentiometer gave simple solutions to missing problems with a single control knob.
Author

N75-12210# Forsvarets Teletekniska Lab., Stockholm (Sweden).
A LOOK AT THE FUTURE OF ELECTRONIC COMPONENTS [FRAMTIDSSYN PA TELEKOMPONENTER]
T. G. Charles Feb. 1972 51 p In SWEDISH
(FTL-A-A28:1) Avail: NTIS HC $4.25

The total component market seems to have a stable annual value and is divided equally between U.S.A., West Europe and Japan. The increase in annual value is expected to become relatively large for opto-electronics, integrated circuits and batteries. Moderate increases are expected in electrolytic, ceramic and plastic condensers as well as metal film and metal-glass

resistances. Reductions are anticipated for transistors, diodes, electronic valves, variable resistances, transformers and contact devices. In the long run hybrid circuits may replace printed circuits. Author

N75-12211# Royal Aircraft Establishment, Farnborough (England).
THE TORQUES OCCURRING IN THE STARTING OF POLYPHASE INDUCTION-MOTORS WITH SQUIRREL-CAGE ROTORS
H. Moeller Sep. 1974 44 p refs Transl. into ENGLISH from Arch. Elektrotech. (Berlin), v. 24, 1930 p 401-424
(RAE-Lib-Trans-1782; BR43697) Avail: NTIS HC $3.75

The torque/speed characteristics of 57 squirrel cage induction motors, each of which has a different rotor/stator slot combination were examined, and comments on the effects of the numbers of slots on the characteristics of the machines are made. It is claimed that the phenomena of synchronous crawling was noted for the first time, and an explanation of asynchronous crawling and of cogging is offered. Author

N75-12212# Atomic Energy Establishment, Cairo (Egypt). Dept. of Engineering and Scientific Instruments.
POWER SUPPLY FOR HELMHOLTZ COILS
Nabil N. Hanna 1973 21 p refs
(AREAEE-177) Avail: AEC Depository Libraries HC $4.25

A regulated power supply suitable for driving the Helmholtz coils used to neutralize the vertical and horizontal components of the earth's magnetic field in an iron-free beta-ray spectrometer is described. The supply delivers an adjustable voltage in the range 20 to 40 V at a maximum load current of 5A. Over the whole voltage range, the output voltage stability is better 0.03% for + or - 10% variations in mains voltage. The output resistance is less than 0.005 ohms and the temperature coefficients is about + 2 mV/C at room temperature. NSA

N75-12213# Los Alamos Scientific Lab., N.Mex.
CONDUCTOR TESTS FOR dc SUPERCONDUCTING POWER TRANSMISSION
R. J. Bartlett, E. F. Hammel, J. K. Hoffer, W. E. Keller, E. C. Kerr, T. E. McDonald, R. D. Taylor, and W. J. Trela 1974 12 p refs Presented at 5th Intern. Cryogenic Engr. Conf., Kyoto, Japan, 7 May 1974
(Contract W-7405-eng-36)
(LA-UR-74-724; Conf-740509-6) Avail: NTIS HC $3.25

The cryogenic and electrical aspects of a new program to evaluate superconductors suitable for a dc superconducting power transmission line are presented. Short sample tests at 4K at currents up to 39 kA and test bed operation up to 10 kA are described. Author

N75-12214# Illinois Univ., Urbana. Coordinated Science Lab.
SURFACE ACOUSTIC WAVE NOTCH FILTER USING A PHASE-SHIFTING TECHNIQUE M.S. Thesis
Thomas George Wear Jul. 1974 45 p refs
(Contract DAAB07-72-C-0259)
(AD-785569; R-651; UILU-ENG-74-2217) Avail: NTIS CSCL 09/5

Surface acoustic wave (SAW) devices have been under development for about the past six years. These devices lend themselves to the construction of small, inexpensive delay lines and other wavelength-dependent devices because acoustical waves in solids propagate with a velocity roughly 100,000 times smaller than the speed of light. Surface acoustic wave devices already in commercial use include radar pulse compression filters, precisely shaped bandpass filters for color television, and other communication systems, low noise microwave generators, and various types of coding equipment. Author (GRA)

N75-12215# Naval Research Lab., Washington, D.C.
COMPARISON OF A CUBE-TEXTURED-NICKEL AND A NICKEL-200 MAGNETOSTRICTIVE RING TRANSDUCER Interim Report
Joel A. Sinsky 12 Aug. 1974 32 p refs
(NRL Proj. S02-19; XF11121100)
(AD-785012; NRL-7779) Avail: NTIS CSCL 09/1

The magnetic and magnetostrictive properties of a magnetostrictive scroll-wound ring transducer made from cube-textured nickel were measured and compared to the corresponding properties of a ring transducer made from conventional Nickel 200. Both transducers were separately excited in air at low-power linear drive levels with varying induction fields of magnetization, and their electrical input impedances were measured. Some in-water measurements were also made on the two rings at nearly optimum values of induction field. The data obtained can be used to choose the type of ring and the induction-field level of operation which will best satisfy a given requirement. Author (GRA)

N75-12216# Illinois Univ., Urbana. Coordinated Science Lab.
OPTIMAL DESIGN OF RECURSIVE DIGITAL FILTERS M.S. Thesis
Timothy Lawton Walters Sep. 1973 80 p refs
(Contract DAAB07-72-C-0259)
(AD-785571; R-628; UILU-ENG-73-2230) Avail: NTIS CSCL 09/5

Until very recently, the problem of choosing the coefficients of recursive digital filters has been relatively unexplored. Most design techniques involve transformations of continuous filter designs. First an analog filter is designed using long established techniques and then the analog filter is transformed into a digital filter. This paper will explore some new design techniques and describe a practical method for the design of recursive digital filters with prescribed magnitude characteristics. GRA

N75-12217# Lehigh Univ., Bethlehem, Pa.
INVESTIGATION OF THE PHYSICAL ORIGINS OF NOISE IN AVALANCHE AND GUNN OSCILLATORS AND NOISE REDUCTION TECHNIQUES Final Report, 15 Dec. 1970 - 15 Mar. 1974
Daniel Leenov and John G. Ondria 8 May 1974 55 p refs
(Grant DA-ARO(D)-31-124-71-G41)
(AD-780935/3; AROD-9283.4-EL) Avail: NTIS HC $4.25 CSCL 09/5

The noise generated by Gunn diode microwave oscillators was studied to determine the physical causes of noise, the relation between low frequency and microwave noise, and to develop an equivalent circuit for the diode. The use of a cavity to reduce FM noise was investigated. Methods for optimizing the performance of IMPATT diode oscillators, including noise performance, were studied. GRA

N75-12218# Texas Univ., Austin. Electronics Research Center.
TEXAS BIANNUAL OF ELECTRONICS RESEARCH NO. 19 Interim Report, 1 Oct. 1973 - 31 Mar. 1974
Arwin A. Dougal, J. K. Aggarwal, O. M. Friedrich, Jr., E. J. Powers, and P. C. Richardson 15 May 1974 248 p refs
(Contract F44620-71-C-0091; AF Proj. 4751)
(AD-784968; AFOSR-74-1425TR) Avail: NTIS CSCL 09/3

This Nineteenth Biannual includes recent findings, research investigations, progress reports and future plans in the areas of Solid State Electronics, Information Systems, Plasma and Quantum Electronics, Bio-Medical Electronics, and Acoustics and Radio Sciences. (Modified author abstract) GRA

N75-12219# Harvard Univ., Cambridge, Mass. Div. of Engineering and Applied Physics.
ANALYSIS OF CROSSED WIRES IN A PLANE-WAVE FIELD
Ronald W. P. King and T. T. Wu Jul. 1974 53 p refs
(Contract N00014-67-A-0298-0005; NR Proj. 371-016)
(AD-784972; TR-653) Avail: NTIS CSCL 09/5

The currents and charges induced in a pair of electrically thin crossed wires by a normally incident plane electromagnetic wave are derived by analytical methods. The boundary conditions at the junction are explained and compared with the somewhat different ones used in the past. The solution of a new integro-differential equation for the currents is obtained in terms of trigonometric and integral-trigonometric functions. Depending on the electrical lengths of the crossed elements and the location of their junction a variety of quite different distributions of current and charge is obtained. These determine the scattered near and far fields. Author (GRA)

N75-12220# Army Mobility Equipment Research and Development Center, Fort Belvoir, Va.
TYPE 2 FILM SUPERCONDUCTORS FOR POWER APPLICATIONS
Hermann J. Spitzer May 1974 39 p
(DA Proj. 1T1-61102-A-34A)
(AD-785534; USAMERDC-2101) Avail: NTIS CSCL 20/12

A basic theoretical background of type 2 superconductors and an introduction into materials are presented. The requirements for these materials for Army power applications are analyzed and compared with the present availability of these materials. A series of solid-solution alloy systems has been investigated, namely Niobium-Zirconium, Niobium-Titanium, Niobium-Tantalum, Titanium-Vanadium, Niobium-Vanadium, and Tantalum-Titanium. In addition, a few compound systems have been examined, namely Niobium-Nitride, Niobium-Carbide, and the solid solution or substitution compound system of Niobium-Nitride-Carbide. Also, work has been initiated on intermetallic compounds, namely Niobium-Aluminum, Niobium-Germanium, and Niobium Gallium. GRA

N75-12221# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
DESIGN AND FABRICATION OF A VERSATILE TESTING SYSTEM FOR MNOS M.S. Thesis
Daniel J. Abshire Jun. 1974 106 p refs
(AD-785131; GE/EE/74-22) Avail: NTIS CSCL 09/1

The versatile testing system for MNOS is a programmable generator that generates wavetrains necessary to measure writing characteristics, memory retention, and degradation information. It is capable of generating both positive and negative pulses of different amplitudes and widths. The generator also has the capability of increasing the widths of predetermined pulses after each wavetrain has been generated, and halting operation when a predetermined width has been reached. It functions as an independent unit, once programmed it is capable of generating the required wavetrains, and measuring the threshold voltage of a test device without assistance from any external device. (Modified author abstract) GRA

N75-12052 Societe Nationale Industrielle Aerospatiale, Paris (France). Div. des Systemes Balistiques et Spatiaux.
COMMAND ELECTRONICS OF THE INERTIA WHEEL [ELECTRONIQUE DE COMMANDE DE LA ROUE A INERTIE]
In its Design and Develop. of a Momentum Wheel with a Mainly Passive Magnetic Bearing, Phase 1, Vol. 2 31 May 1974 85 p In FRENCH (For availability see N75-12041 03-18)

N75-12698 RCA Research Labs., Sainte Anne de Bellevue (Quebec).
INTERDIGITAL TRANSDUCERS AND ACOUSTIC-SURFACE-WAVE FILTERS
D. H. Hurlburt *In* Commun. Res. Centre Proc. of the Can. Workshop on Acoustic Surface Waves Jun. 1974 5 p (For availability see N75-12696 03-70)

N75-12702 McGill Univ., Montreal (Quebec). Dept. of Electrical Engineering.
NONLINEAR EFFECTS: AMPLIFIERS AND CONVOLVERS
E. L. Adler *In* Commun. Res. Centre Proc. of the Can. Workshop on Acoustic Surface Waves Jun. 1974 8 p (For availability see N75-12696 03-70)

N75-12834 Joint Publications Research Service, Arlington, Va.
THYRISTOR dc ELECTRIC DRIVE WITH TIME-PROPORTIONAL SPEED CONTROL
Aleksandur Ivanov and Prodan Prodanov *In its* Transl. on Eastern Europe: Sci. Affairs, no. 440 (JPRS-63573) 3 Dec. 1974 p 10-12 Transl. into ENGLISH from Voenna Tekhn. (Sofia), no. 9, 1974 p 35-36 (For availability see N75-12832 03-81)

N75-12838 Joint Publications Research Service, Arlington, Va.
DEVELOPMENT OF SOLID-STATE MICROWAVE ELECTRONICS
Adam Smolinski *In its* Transl. on Eastern Europe: Sci. Affairs, no. 438 (JPRS-63447) 15 Nov. 1974 p 26-29 refs Transl. into ENGLISH from Elektron. (Warsaw), no. 7-8, Jul.-Aug. 1974 p 316-317 (For availability see N75-12836 03-81)

N75-12839 Joint Publications Research Service, Arlington, Va.
DEVELOPMENT OF INTEGRATED CIRCUITS
Andrzej Ambroziak *In its* Transl. on Eastern Europe: Sci. Affairs, no. 438 (JPRS-63447) 15 Nov. 1974 p 30-33 refs Transl. into ENGLISH from Elektron. (Warsaw), no. 7-8, Jul.-Aug. 1974 p 318-319 (For availability see N75-12836 03-81)

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics.*

N75-12222* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
STRUCTURAL HEAT PIPE Patent
Stanford Ollendorf, inventor (to NASA) Issued 12 Nov. 1974 5 p Filed 14 Sep. 1973 Supersedes N73-32828 (11 - 23, p 2857)
(NASA-Case-GSC-11619-1; US-Patent-3,847,208; US-Patent-Appl-SN-397476; US-Patent-Class-165-1; US-Patent-Class-138-113; US-Patent-Class-138-114; US-Patent-Class-138-148; US-Patent-Class-220-15; US-Patent-Class-165-47; US-Patent-Class-165-105; US-Patent-Class-244-1SC) Avail: US Patent Office CSCL 20M

A combined structural reinforcing element and heat transfer member is disclosed for placement between a structural wall and an outer insulation blanket. The element comprises a heat pipe, one side of which supports the outer insulation blanket, the opposite side of which is connected to the structural wall. Heat penetrating through the outer insulation blanket directly reaches the heat pipe and is drawn off, thereby reducing thermal gradients in the structural wall. The element, due to its attachment to the structural wall, further functions as a reinforcing member. Official Gazette of the U.S. Patent Office

N75-12223+ Engineering Sciences Data Unit, London (England).
ONE-DIMENSIONAL COMPRESSIBLE GAS FLOW IN DUCTS
Oct. 1974 22 p Sponsored by Roy. Aeron. Soc., Inst. of Chem. Engr., Inst. of Mech. Engr., and Inst. of Struct. Engr.
(ESDU-74028) Copyright. Avail: NTIS HC $122.50

A number of equations for the analysis of one-dimensional compressible gas flow. The equations are presented graphically for a range of values of the ratio of specific heat capacity at constant pressure to that at constant volume. Examples are given for the following: (1) one dimensional isentropic flow, (2) static to total state relations, (3) critical pressure ratio, expansion through a throat, and (4) isentropic expansion from rest. Author

N75-12224# Royal Aircraft Establishment, Farnborough (England).
LOW-PRESSURE MEASUREMENT BY THERMISTOR, AND ORIFICE-EFFECT DETERMINATION IN RAREFIED GAS FLOWS
J. Allegre, M. Cabaret, and M. Raffin Sep. 1974 24 p refs Transl. into ENGLISH from French Rept-71-6
(RAE-Lib-Trans-1734; BR43709; Rept-71-6) Avail: NTIS HC $3.25

The use of thermistors for the measurement of gas-pressures between 0.1 and 60 N/sq m is discussed. It is shown that this type of gauge offers the advantage of very small external dimensions which makes them suitable for direct mounting within small wind-tunnel models. Details of suitable electrical circuits for use with thermistor pressure gauges are described together with an account of their operating characteristics. A survey has also been made of the corrections, due to orifice effects, which must be applied to surface and pitot pressure measurements made in a rarefied gas flow. Experimental data are presented which show the dependence of this correction on

both Mach number and Reynolds number. In the case of pitot probes, this data permits the probe diameter to be chosen so that these effects can be minimized. Author

N75-12225 Association Aeronautique et Astronautique de France, Paris.
SUBCRITICAL AND SUPERCRITICAL COMPRESSIBLE FLOWS WITHOUT SHOCK IN VANE MESHES [ECOULEMENTS COMPRESSIBLES SUBCRITIQUES ET SUPERCRITIQUES SANS CHOC DANS LES GRILLES D'AUBES]
T. S. Luu, G. Coulmi, and A. Grissa 1974 32 p refs In FRENCH
(AAAF-NT-74-1) Avail: Assoc. Aeron. et Astronautique de France 20 F

Calculation of the potential compressible flow around a vane mesh was carried out without any hypothesis on small perturbations and respecting the isentropic compressibility law and the conditions for fluid friction on the vane profiles. A Poisson form for the velocity potential equation was obtained. The solution depends both on source distribution in space, the intensity of which corresponds to the RMS, and on source and vortices distribution on the profile edges determined by imposing friction and Kutta-Joukowski conditions. An iterative calculation is required to fix the source density in space depending on the local Mach number and the tangential derivative of the local velocity modules. For any slope angle and various upstream Mach numbers, the calculation allows, for a given vane geometry, determination of passive and downstream conditions. It is shown that the computation converges even in supercritical regimes before shock appearance. ESRO

N75-12226# DCW Industries, Sherman Oaks, Calif.
NUMERICAL STUDY OF SEPARATED TURBULENT FLOWS
David C. Wilcox 10 Jul. 1974 38 p refs Backup document for AIAA Synoptic scheduled for publication in the AIAA Journal in May 1975
(Contract F33615-72-C-1780)
Avail: NTIS HC $3.75

Supersonic-turbulent-boundary-layer separation has been studied numerically in six time-marching finite-difference calculations based on the Saffman-turbulence-model equations. Separation of a turbulent flat-plate boundary layer is predicted in all six cases. In three, boundary-layer interaction with an oblique shock wave induces separation; in the other three flow-fields, flow into a flat plate-ramp compression corner causes separation. For the shock-wave-boundary-layer interactions, computed flow properties agree with corresponding experimental data. However, computed and measured compression-corner flow properties differ noticeably. Discrepancies may be caused either by possible inapplicability of the eddy-viscosity concept for supersonic compression-corner flow or by three dimensional effects in the experimental fields. Author

N75-12227# Cincinnati Univ., Ohio. Dept. of Aerospace Engineering.
A NUMERICAL METHOD FOR THE SOLUTION OF PARTICULATE FLOW EQUATIONS
A. Hamed and W. Tabakoff Jul. 1974 31 p refs Backup document for AIAA Synoptic scheduled for publication in AIAA Journal in Jun. 1975
(Contract DAHC04-69-C-0016)
(Rept-74-42) Avail: NTIS HC $3.75

A numerical method is developed to solve the equations that govern the motion of the two dimensional flow of a suspension consisting of incompressible viscous gas and suspended solid particles. The numerical method is implicit, second order, and iterative. The frozen and equilibrium wall friction coefficient are compared with the corresponding analytically determined values for a simple example, and are found to be in agreement. It is concluded that the numerical method for investigating the nonequilibrium flow regime, gives accurate results not only for nonequilibrium flow conditions, but also predicts frozen and equilibrium flow conditions. Author

N75-12228*# Michigan State Univ., East Lansing. Div. of Engineering Research.
APPLICATION OF WAVE MECHANICS THEORY TO FLUID DYNAMICS PROBLEMS: FUNDAMENTALS
M. Z. V. Krzywoblocki 30 Oct. 1974 206 p refs
(Grant NGR-23-004-085)
(NASA-CR-140847; TR-1) Avail: NTIS HC $7.25 CSCL 20D

The application of the basic formalistic elements of wave mechanics theory is discussed. The theory is used to describe the physical phenomena on the microscopic level, the fluid dynamics of gases and liquids, and the analysis of physical phenomena on the macroscopic (visually observable) level. The practical advantages of relating the two fields of wave mechanics and fluid mechanics through the use of the Schroedinger equation constitute the approach to this relationship. Some of the subjects include: (1) fundamental aspects of wave mechanics theory, (2) laminarity of flow, (3) velocity potential, (4) disturbances in fluids, (5) introductory elements of the bifurcation theory, and (6) physiological aspects in fluid dynamics. Author

N75-12229*# Michigan State Univ., East Lansing. Div. of Engineering Research.
APPLICATION OF WAVE MECHANICS THEORY TO FLUID DYNAMICS PROBLEMS: FLAT PLATE FLOW
M. Z. V. Krzywoblocki 31 Oct. 1974 32 p
(Grant NGR-23-004-085)
(NASA-CR-140848; TR-2) Avail: NTIS HC $3.75 CSCL 20D

The characteristics of the flow in the laminar boundary layer along an infinitely long flat plate are discussed. The flow may be disturbed or not, depending on the situation. The physical, natural aspects of the flow, either a laminar flow free from disturbances or a flow which originally is a laminar one with disturbances superimposed upon it. Oscillograms of turbulence in wind tunnel tests and in the wake of a cylinder are presented. Author

N75-12230*# Michigan State Univ., East Lansing. Div. of Engineering Research.
APPLICATION OF WAVE MECHANICS THEORY TO FLUID DYNAMICS PROBLEMS: BOUNDARY LAYER ON A CIRCULAR CYLINDER INCLUDING TURBULENCE
M. Z. V. Krzywoblocki 28 Oct. 1974 105 p refs
(Contract NGR-23-004-085)
(NASA-CR-140849; TR-3) Avail: NTIS HC $5.25 CSCL 20D

The application of the elements of quantum (wave) mechanics to some special problems in the field of macroscopic fluid dynamics is discussed. Emphasis is placed on the flow of a viscous, incompressible fluid around a circular cylinder. The following subjects are considered: (1) the flow of a nonviscous fluid around a circular cylinder, (2) the restrictions imposed the stream function by the number of dimensions of space, and (3) the flow past three dimensional bodies in a viscous fluid, particularly past a circular cylinder in the symmetrical case. Author

N75-12231# Mitsubishi Heavy-Industries, Ltd., Tokyo (Japan).
A STUDY ON GAS-LIQUID CONTACT APPARATUS ROTARY ATOMIZER
Mitsuharu Murakami, Masaaki Yanagi, and Tomihiro Nakamura Sep. 1974 11 p refs
(Bull-93) Avail: NTIS HC $3.25

The gas-liquid contact operation in which the gas is blown into the liquid and dispersed therein is discussed as one of the important unit operations in chemical processes. The characteristics of the high efficiency gas-liquid contact apparatus rotary atomizer and its application to chemical processes have been studied and data obtained experimentally in its performance and scale-up. An outline of the data and the results of application are described of the rotary atomizer to the air oxidation of sodium sulfite solution from the flue-gas, desulfurization plant employing the sodium sulfate process. Author

N75-12232# Technische Universitaet, Munich (West Germany).
STUDY OF THE TURBULENT TORQUE FLOW IN A CYLINDRICAL MODEL APPARATUS Ph.D. Thesis [UNTERSUCHUNG DER TURBULENTEN DRALLSTROEMUNG IN EINEM ZYLINDRISCHEN MODELLAPPARAT]
Rainer Meixlsperger 1 Aug. 1973 29 p refs In GERMAN
Avail: NTIS HC $3.75

The torque flow field was studied in a cylindrical apparatus with differing inlet geometries. It is shown that velocity profiles

and flow symmetries depend on the boundary conditions of the apparatus; tangential and axial flow profiles are determined by the radial field, respectively, the geometry of the apparatus.
Transl. by G.G.

N75-12233*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
EFFECT OF NONSYMMETRICAL FLOW RESISTANCE UPON ORIFICE IMPEDANCE RESISTANCE
Joe W. Posey and Kevin J. Compton Dec. 1974 18 p refs Presented at the 88th Meeting of the Acoust. Soc. of Amer., St. Louis, 8 Nov. 1974
(NASA-TM-X-72624) Avail: NTIS HC $3.25 CSCL 20D

A nonreactive orifice in an infinite baffle is analyzed. The pressure difference delta across the orifice varies sinusoidally with amplitude 1.0 and average value -P. The orifice resistance, delta p is discontinuous at zero velocity and exhibits the constant values R sub + and R sub - for u > 0 and u < 0, respectively. The resultant velocity has power in all harmonics of the excitation frequency. A quasi-linear resistance is defined and found to be relatively insensitive to the presence or absence of a resonant backing cavity; however, it does vary from 1.33 R sub + to 0.67 R sub + for a resistance ratio R sub +/R sub - between 0.5 and 2.0. Author

N75-12234*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
TURBULENT HEAT TRANSFER PREDICTION METHOD FOR APPLICATION TO SCRAMJET ENGINES
S. Z. Pinckney Washington Nov. 1974 66 p refs
(NASA-TN-D-7810; L-9816) Avail: NTIS HC $4.25 CSCL 21E

An integral method for predicting boundary layer development in turbulent flow regions on two-dimensional or axisymmetric bodies was developed. The method has the capability of approximating nonequilibrium velocity profiles as well as the local surface friction in the presence of a pressure gradient. An approach was developed for the problem of predicting the heat transfer in a turbulent boundary layer in the presence of a high pressure gradient. The solution was derived with particular emphasis on its applicability to supersonic combustion; thus, the effects of real gas flows were included. The resulting integrodifferential boundary layer method permits the estimation of cooling requirements for scramjet engines. Theoretical heat transfer results are compared with experimental combustor and noncombustor heat transfer data. The heat transfer method was used in the development of engine design concepts which will produce an engine with reduced cooling requirements. The Langley scramjet engine module was designed by utilizing these design concepts and this engine design is discussed along with its corresponding cooling requirements. The heat transfer method was also used to develop a combustor cooling correlation for a combustor whose local properties are computed one dimensionally by assuming a linear area variation and a given heat release schedule. Author

N75-12235*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
SWEEP EFFECT ON THE DRAG OF ROWS OF PERPENDICULAR CIRCULAR CYLINDERS IN A LAMINAR BOUNDARY LAYER AT SUPERSONIC FREE-STREAM VELOCITIES
Milton Lamb and Robert L. Stallings, Jr. Washington Dec. 1972 18 p refs
(NASA-TN-D-7812; L-9799) Avail: NTIS HC $3.25 CSCL 20D

Drag measurements were obtained for circular cylinders attached perpendicularly to a flat-plate surface. Measurements were obtained for a single cylinder and for rows of cylinders. The cylinders were alined at various sweep angles relative to the free-stream velocity vector and at spacings appropriate for roughness elements used as boundary layer trips. The drag measurements were obtained for Mach numbers of 3.95 and 4.60, ratios of cylinder height to an undisturbed laminar boundary layer displacement thickness of approximately 1.0 to 3.0, a cylinder height-to-diameter ratio of approximately 2, and sweep angles up to 60. A complete presentation of the experimental results is given. A discussion of the more significant findings, including the most appropriate parameters for correlating the experimental results, is presented. Author

N75-12236# McGill Univ., Montreal (Quebec).
FLUTTER OF CONSERVATIVE SYSTEMS OF PIPES CONTAINING SUBSONIC FLOW
M. P. Paidoussis Dec. 1973 28 p refs
(MERL-TN-73-2) Avail: NTIS HC $3.75

The dynamics of beam-like motions of pipes conveying fluid, with both ends clamped, are examined by means of beam theory and, in the case of thin-walled pipes, also by means of thin shell theory. Both theories predict that the system loses stability by divergence at sufficiently high flow velocity, and that at higher flow velocity the system is subject to coupled-mode flutter; between the two instabilities sometimes there is a region where the system is completely stable. The critical flow velocities obtained by beam theory and by shell theory are compared and it is shown that the former converge towards the latter as the length of the pipe increases. The existence of coupled-mode flutter in gyroscopic conservative systems, such as the one investigated here, is briefly discussed. Author

N75-12237# Technische Universitaet, Hanover (West Germany).
EROSIVE DESTRUCTION BY CAVITATION FLOW Ph.D. Thesis [EROSIVE ZERSTOERUNGEN DURCH STROEMUNGSKAVITATION]
Hartmut Louis 14 May 1973 171 p refs In GERMAN
Avail: NTIS HC $6.25

An intensive erosion cavitation chamber is developed and used to prove the corrosive and erosive effects of bubble explosion on metal surfaces. The mechanical loads during initial fluidic impact on soft aluminum are studied for erosive cavitation intensities. Transl. by G.G.

N75-12238# Technische Hogeschool, Delft (Netherlands). Lab. for Refrigeration.
THE INFLUENCE OF FROST FORMATION AND DEFROSTING ON THE PERFORMANCE OF AIR COOLERS Ph.D. Thesis
C. Th. Sanders Sep. 1974 173 p refs
(WTHD-63) Avail: NTIS HC $6.25

The effects of frost formation on refrigerating equipment are examined to show the influence on the design of the equipment. The fundamentals of the frost formation process are discussed to supply basic information for the effects of frost on cooler performance. The specific problems involve: (1) a decrease in cooling capacity, (2) a decrease of air flow rate, and (3) interruption of operation for defrosting. A schematic representation of the change of cooling capacity and air flow rate as a function of frost formation is provided. Author

N75-12239# Lockheed Missiles and Space Co., Palo Alto, Calif.
INVESTIGATION OF THE HEAT EXCHANGE IN DEMOUNTABLE CONNECTIONS OF CRYOGENIC SYSTEMS
Iu. V. Bolshakov, Ia. L. Brailovskii, F. M. Pozvonkov, I. E. Salnikov, and N. V. Filin 11 Jun. 1973 5 p refs Transl. into ENGLISH from Inzh. Fiz. Zh., Akad. Nauk Belorussk. SSR (Minsk), v. 27, no. 1, 1974 p 133-136
Avail: NTIS HC $3.25; National Translation Center, John Crerar Library, Chicago, Ill. 60616

The temperature fields of a system of concentric cylinders with gas in the separating gap are determined theoretically and experimentally. The boundary conditions characterized by constancy of the temperatures of different magnitude at the connection endfaces and by the presence of heat exchange on the cylindrical surfaces of the connection element are determined according to the Fourier law. Author

N75-12240# Lockheed Missiles and Space Co., Palo Alto, Calif.
ANALYSIS OF THE WORKING PROCESS OF A FREE PISTON EXPANDER
27 Apr. 1972 5 p refs Transl. into ENGLISH from Kholodiln. Tekhn. Tekhnol. (Kiev), no. 17, 1973 p 36-41
Avail: NTIS HC $3.25; National Translation Center, John Crerar Library, Chicago, Ill. 60616

The operating characteristics of a free piston expander mechanical device are described. A diagram of the construction of the apparatus is presented. A theoretical indicator diagram of

the expander cavity is developed. Curves are included to show the dependence of the technical expander efficiency on the degree of pressure reduction for various pressure conditions. Equations for the working processes are derived for calculation of the values of efficiency for various conditions. Author

N75-12241# Research Inst. of National Defence, Stockholm (Sweden).

SOME ANALOGUE CONTROL TECHNIQUES IN APPLIED FLUIDICS [NAGRA ANALOGA REGLERTEKNISKT INTRESSANTA FLUIDISTORSYSTEM]

Stefan Flodberg Nov. 1972 30 p refs In SWEDISH
(FOA-2-C-2576-E4) Avail: NTIS HC $3.75

Descriptions of components and circuits for a fluidic analog control system are given. Circuits have been built for phase advance and retardation by means of amplifiers and summation devices. A position servo has been analyzed. A special study of applied fluidics for control purposes is included. Author

N75-12242# Massachusetts Inst. of Tech., Cambridge. Fluid Mechanics Lab.

OSMOSIS AND ION TRANSPORT IN CHARGED POROUS MEMBRANES: A MACROSCOPIC, MECHANISTIC MODEL

Ain A. Sonin Sep. 1974 22 p refs
(Grant NSF GK-35798X)
(Publ-74-6) Avail: NTIS HC $3.25

Based on a simple mechanistic model where mass exchange takes place by continuum flow in charged, macroscopic pores, explicit equations are derived for water and ion fluxes through a charged membrane. The equations (which contain nonlinearities) show the cross coupling between the fluxes, and the coefficients are expressed explicitly in terms of the physical structure and fixed charge content of the membrane, as well as the properties of the permeant fluid. The model is applied to the hyperfiltration or reverse osmosis mode where salt is rejected as the solution is forced through the membrane under pressure. Author

N75-12243*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

WEAK INCIDENT SHOCK INTERACTIONS WITH MACH 8 LAMINAR BOUNDARY LAYERS

Louis G. Kaufman, II (Grumman Aerospace Corp.) and Charles B. Johnson Washington Dec. 1974 47 p refs
(NASA-TN-D-7835; L-9792) Avail: NTIS HC $3.75 CSCL 20D

Weak shock-wave interactions with boundary layers on a flat plate were investigated experimentally in Mach 8 variable-density tunnel for plate-length Reynolds numbers. The undisturbed boundary layers were laminar over the entire plate length. Pressure and heat-transfer distributions were obtained for wedge-generated incident shock waves that resulted in pressure rises ranging from 1.36 to 4.46 (both nonseparated and separated boundary-layer flows). The resulting heat-transfer amplifications ranged from 1.45 to 14. The distributions followed established trends for nonseparated flows, for incipient separation, and for laminar free-interaction pressure rises. The experimental results corroborated established trends for the extent of the pressure rise and for certain peak heat-transfer correlations. Author

N75-12244*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

NUMERICAL AND EXPERIMENTAL STUDIES OF THE NATURAL CONVECTION WITHIN A HORIZONTAL CYLINDER

Roger B. Stewart, Alexander P. Sabol, and Lillian R. Boney Washington Dec. 1974 66 p refs
(NASA-TN-D-7728; L-9652) Avail: NTIS HC $4.25 CSCL 20D

Numerical solutions are obtained for the quasi-compressible Navier-Stokes equations governing the time-dependent natural convection within a horizontal cylinder. The early flow development and wall heat transfer are obtained after a uniformly cold wall is imposed as a boundary condition on the cylinder. Results are also obtained for a time-varying cold wall as a boundary condition with windward explicit differencing used for the numerical solutions. The viscous truncation error associated with this scheme is controlled so that first-order accuracy is maintained in time and space. Experiments within a small-scale instrumented horizontal cylinder revealed the time development of the temperature distribution across the boundary layer as well as the decay of wall heat transfer with time. Agreement between temperature distributions obtained experimentally and numerically was generally good. The time decay of the dimensionless ratio of the Nusselt number to the one-fourth power of the Grashof number is found both numerically and experimentally, and good agreement is obtained between these two results over most of the cylinder wall. Author

N75-12245*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

SOME OBSERVATIONS OF THE EFFECTS OF RADIAL DISTORTIONS ON PERFORMANCE OF A TRANSONIC ROTATING BLADE ROW

Donald M. Sandercock and Nelson L. Sanger Washington Dec. 1974 51 p refs
(NASA-TN-D-7824; E-7545) Avail: NTIS HC $4.25 CSCL 20D

A single rotating blade row was tested with two magnitudes of tip radial distortion and two magnitudes of hub radial distortion imposed on the inlet flow. The rotor was about 50 centimeters (20 in.) in diameter and had a design operating tip speed of approximately 420 meters per second (1380 ft/sec). Overall performance at 60, 80, and 100 percent of equivalent design speed generally showed a decrease (compared to undistorted flow) in rotor stall margin with tip radial distortion but no change, or a slight increase, in rotor stall margin with hub radial distortion. At design speed there was a decrease in rotor overall total pressure ratio and choke flow with all inlet flow distortions. Radial distributions of blade element parameters are presented for selected operating conditions at design speed. Author

N75-12246# Tokyo Univ. (Japan). Inst. of Space and Aeronautical Science.

HYPERSONIC FLOW AROUND BLUNT BODY AT ANGLES OF ATTACK

Ryuma Kawamura and Takashi Nakajima Oct. 1974 30 p refs
(ISAS-515-Vol-39-12) Avail: NTIS HC $3.75

An analytical method for solving the hypersonic flow around a blunt body (two-dimensional flat-faced body) at angles of attack is presented. The origin of the coordinate system is placed at the stagnation point and the position of the shoulder is determined as the point where the flow variables change abruptly. By doing so, the position of the stagnation point relative to that of the shoulders can be determined. The solution in the stagnation region is obtained first by solving the Navier-Stokes equations under the constant density assumption. The appropriate forms of the velocity components are used in the stagnation region. The flow field from the stagnation region to the shoulder is solved using the solution obtained in the stagnation region as the initial condition under the constant density assumption. The results are shown for the shape of the shock wave, the position of the stagnation point relative to that of the shoulders and the deviation of the maximum-entropy-streamline from the zero- or stagnation-stream-line, for several values of the angle of attack and the Reynolds number. And the validity of the procedure used is examined by comparing the results obtained for the inviscid symmetrical problem with the already obtained ones. Finally, the procedures for extending the present method to the analysis of the flow field around the curved blunt body with shoulders at angles of attack are described. Author

N75-12247# Research Inst. of National Defence, Sundbyberg (Sweden).

GAUST: A COMPUTER PROGRAM FOR CALCULATING GAS FLOW FROM HOLDERS CONTAINING CONDENSED GAS [GASUT - ETT DATORPROGRAM FOER BERAEKNING AV GASUTSTROEMNING FRAN BEHALLARE INNEHALLANDE KONDENSERAD GAS]

Anders Hasselrot, Ola Hertzberg, and Christina Holmberg Jan. 1973 29 p In SWEDISH Submitted for publication
(FOA-1-C-1498-C3(H6)) Avail: NTIS HC $3.75

A mathematical model and a FORTRAN program are described for determination of gas flow from a pressurized tank in which the outflow is through a hole or tube. The calculation is carried

out for small time intervals for which the outflow is considered as constant. Author

N75-12248*# Virginia Polytechnic Inst. and State Univ., Blacksburg.
EFFECT OF INTERJET SPACING ON MIXING OF MULTIPLE COAXIAL JETS IN SUPERSONIC FLOW Final Report
A. K. Lorber Washington NASA Dec. 1974 90 p refs
(Contract NAS1-10233)
(NASA-CR-2469; VPI-Aero-015) Avail: NTIS HC $4.75 CSCL 20D

An experimental and analytical investigation of strut-mounted, four-nozzle, downstream facing, gaseous fuel injector assembly was conducted in a Mach 4 air-stream with P = 154 psia and T sub o 520 R. Helium was used as the injectant, and the interjet spacing (S/D) was the main parameter varied. The principal data are in the form of Helium concentration profiles at seven axial stations, Mach number distributions at three axial stations and schlieren photographs of the flow field at different interjet spacings. An approximate analysis was developed based upon a linearization in the Von Mises plane, Crocco integrals for the temperature and concentrations fields and an eddy viscosity model. Good agreement with the data was achieved. It was found that, at these conditions, interjet spacing has an effect on mixing only up to S/D of approximately 2.5, with concentration of injectant becoming smaller as S/D is increased, and the Mach number downstream of the injector tends to decrease with decreasing S/D. Author

N75-12249# Research Inst. of National Defence, Stockholm (Sweden).
THIRD INTERNATIONAL CONFERENCE ON NUMERICAL METHODS IN FLUID DYNAMICS
N. Hoernqvist and A. Sundstroem Nov. 1972 17 p In SWEDISH Presented in Paris, 3-7 Jul. 1972
(FOA-4-C-4518-A2) Avail: NTIS HC $3.25

Reported abstracts cover the following topics: (1) Navier-Stokes equations; (2) numerical algorithms; (3) meteorology and turbulence; (4) shock waves; (5) viscous fluids; (6) boundary layer flows; (7) laminar boundary layer flows; and (8) transonic flows. Transl. by G.G.

N75-12250# Swedish State Shipbuilding Experimental Tank, Goteborg.
THE CAVITATION LABORATORY OF THE SWEDISH STATE SHIPBUILDING EXPERIMENTAL TANK
Hans Edstrand Jun. 1974 14 p
(Circ-32) Avail: NTIS HC $3.25

The design and operation of a research facility for studying the characteristics of cavitation flow are discussed. Drawings of the facility and the test areas are provided. The nature and effects of cavitation flow are described. Photographs of cavitation flow occurrences are included. The detrimental effects of cavitation are defined as: (1) reduction in propeller efficiency, (2) material erosion, (3) vibration and noise, and (4) steering difficulties for torpedoes. Author

N75-12251# California Univ., Livermore. Lawrence Livermore Lab.
SECOND AND THIRD ORDER DIFFERENCE TECHNIQUES FOR TWO-DIMENSIONAL HYPERBOLIC SYSTEMS OF CONSERVATION LAWS, WITH AN APPLICATION TO TRANSONIC FLOW ABOUT AN AIRFOIL
A. A. Mirin 22 Apr. 1974 80 p refs
(Contract W-7405-eng-48)
(UCRL-51529) Avail: NTIS HC $4.75

The application of second and third order explicit difference techniques to hyperbolic systems of conservation laws is discussed. These difference methods are used to integrate the time-dependent differential equations describing inviscid fluid flow in two dimensions. Emphasis is placed on solving the problem on time-dependent transonic flow about a cusped airfoil. The interior of the unit disc is mapped conformally onto the exterior of the airfoil, and a unit circle is mapped homeomorphically onto the airfoil boundary. A polar grid is constructed in the unit disc and the fluid equations are solved on the grid. The method of characteristics is used to advance the solution at all boundaries of the domain. A cartesian grid in the physical plane is used to advance the fluid equations in a small neighborhood of the cusp. Steady state solutions accurate to second order are obtained as the asymptotic limit of the flow as it tends to infinity. Calculations containing shocks which have either a subsonic or supersonic free stream condition are presented. Author

N75-12252# Los Alamos Scientific Lab., N.Mex.
PROCESS ENVIRONMENT EFFECTS ON HEAT PIPES FOR FLUID-BED GASIFICATION OF COAL
D. C. Strimbeck, D. C. Sherren, and E. S. Keddy 1974 20 p refs Presented at the 9th Intersoc. Energy Conversion Eng. Conf., San Francisco, 26-30 Aug. 1974 Sponsored by AEC
(LA-UR-74-984; Conf-740805-1) Avail: NTIS HC $3.25

The Bureau of Mines is evaluating sodium-type heat pipes for the isothermal transport of heat at 2,000 F from a fluid-bed coal-air combustor to a fluid-bed coal-steam gasifier. Tests were conducted to determine the physical and chemical effects of combustion-gasification atmospheres on Inconel 601 pipe. A prototype pipe exposed to such an environment for 522 hours functioned acceptably and remains operable. Tests with this pipe and five pipes of the same design are continuing. Results of initial tests of the six pipes are presented and the pipes and gasification concept are described. Author (NSA)

N75-12253# Sandia Labs., Albuquerque, N.Mex.
NONUNIFORM GRID METHOD FOR TURBULENT BOUNDARY LAYERS
F. G. Blottner 1974 7 p refs Presented at 4th Intern. Conf. on Numerical Methods in Fluid Dynamics, Boulder, Colo., 23 Jun. 1974 Sponsored by AEC
(SAND-74-5023; Conf-740625-1) Avail: NTIS HC $3.25

A Crank-Nicolson type finite-difference scheme with a nonuniform grid spacing has been interpreted in terms of a coordinate stretching approach to show that it is second-order accurate. The variable grid scheme is applied to a flat plate laminar to turbulent boundary layer flow with a rapidly changing grid interval across the layer. The accuracy of the solution is determined for a different number of intervals and compared to results obtained with the Keller box scheme. The influence of changing the grid spacing on the accuracy of the solutions is determined for three coordinate stretching or grid spacing relations. Author

N75-12254*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Aerospace and Ocean Engineering.
ANALYTICAL STUDY OF SUBSONIC TURBULENT BOUNDARY LAYER SEPARATION INCLUDING VISCOUS-INVISCID INTERACTION Final Report, Jun. 1973 - 30 Nov. 1974
G. R. Inger 30 Nov. 1974 48 p refs
(Grant NGR-47-004-119)
(NASA-CR-140958; VPI-Aero-026) Avail: NTIS HC $3.75 CSCL 20D

The prediction of boundary layer deceleration and separation in regions of adverse pressure gradients are discussed as an unsolved problem of fundamental practical importance in aerodynamics. A three layered theoretical flow model of boundary layer separation including viscous-inviscid interaction was conceived for the case of subsonic two dimensional steady laminar flow. M.C.F.

N75-12255# Naval Ordnance Lab., White Oak, Md.
APPROXIMATE ANALYSIS OF HEAT TRANSFER IN TRANSPIRED BOUNDARY LAYERS AT LIMITING PRANDTL NUMBERS
Tse-Fou Zien 1 Jul. 1974 34 p refs
(ZR02302010)
(AD-785239; NOLTR-74-121) Avail: NTIS CSCL 20/4

A simple procedure is developed for approximate calculations of wall heat-transfer rates in transpired boundary layers. Applications of this procedure are illustrated by various examples of incompressible, laminar flows in the limits of large and small Prandtl numbers. A distinguished limit of large Prandtl number and small mass-transfer rate is easily identified, and some limiting solutions are presented for the porous-plate configuration. Calculations for the cases with small Prandtl numbers explicitly demonstrate the usefulness of the method in studying transient heat-conduction problems. The remarkable combination of

accuracy and simplicity represents the principal merit of the method. Author (GRA)

N75-12256# Cincinnati Univ., Ohio. Dept. of Aerospace Engineering.

NUMERICAL SOLUTIONS TO THE FULL VISCOUS SHOCK LAYER EQUATIONS USING AN ALTERNATING DIRECTION IMPLICIT TECHNIQUE

M. J. Werle, B. N. Srivastava, and R. T. Davis Aug. 1974 71 p refs

(Contract N00014-72-A-0027-0001)

(AD-785242; AFL-74-7-13) Avail: NTIS CSCL 20/4

Numerical solutions to the viscous shock layer equations are presented for hypersonic flow past hyperboloids opening to asymptotic total interior angles of 45 degrees and 20 degrees. Solutions were obtained using a modified form of the conventional alternating direction implicit approach which uses a time dependent iterative relaxation process for determining the bow shock shape. Solutions were obtained to the full shock layer equations as well as their thin shock layer approximations for Mach numbers of 10 and 21.75, free stream Reynolds numbers of 430 and 64000 and wall to stagnation temperature ratios of 0.05 and 0.9. Comparisons are made with experimental data and other numerical calculations. It is shown that the present numerical technique provides a stable means of solving the full shock layer problem and that it has a large degree of flexibility in the initiation of the relaxation process. Author (GRA)

N75-12257# Purdue Univ., Lafayette, Ind. Project SQUID Headquarters.

ON THE FLOW NEAR A WEAK SHOCK WAVE DOWNSTREAM OF A NOZZLE THROAT

A. F. Messiter and T. C. Adamson Jul. 1974 27 p refs Prepared in cooperation with Michigan Univ., Ann Arbor

(Contract N00014-67-A-0226-0005; NR Proj. 098-038)

(AD-785283; SQUID-TR-MICH-13-PU) Avail: NTIS CSCL 20/4

In a transonic nozzle flow for which the velocity is slightly supersonic in some neighborhood of the nozzle throat, a shock wave may be present either very close to the throat or somewhat farther downstream. In the latter case, relatively simple series solutions in general provide an asymptotic description of the fluid motion except very close to the shock wave. These outer solutions are reviewed for symmetric two dimensional flow and it is shown that the shock-wave jump conditions are not satisfied. A correction is then derived in the form of an inner solution for a small region immediately behind the shock. The resulting solution exhibits the singularities in pressure gradient, streamline curvature, and shock wave curvature which are expected to occur at the intersection of a normal shock wave and a curved wall. An extension to axisymmetric flow is also given. Author

N75-12258# Massachusetts Inst. of Tech., Cambridge. Acoustics and Vibration Lab.

THE CONNECTION BETWEEN INTERMITTENT TURBULENT ACTIVITY NEAR THE WALL OF A TURBULENT BOUNDARY LAYER WITH PRESSURE FLUCTUATIONS AT THE WALL Technical Report, Oct. 1973 - Jun. 1974

Thomas E. Burton Jun. 1974 183 p refs

(Contract N00014-67-A-0204-0002; SR009-01)

(AD-785271; Rept-70208-10) Avail: NTIS CSCL 20/4

The interaction of fluctuating wall pressure with intermittent sublayer activity was experimentally investigated with a turbulent boundary layer developed on a flat plate in air. Simultaneous measurements of longitudinal fluctuating velocity, longitudinal fluctuating wall shear stress, and fluctuating wall pressure were recorded on analogue tape and later transferred to digital tape. A computer program was written to perform all intermittent signal processing. (Modified author abstract) GRA

N75-12259# Ballistic Research Labs., Aberdeen Proving Ground, Md.

SIMILARITY SOLUTIONS OF THE BOUNDARY LAYER EQUATIONS FOR FLOW OVER A MOVING WALL

James E. Danberg and Kevin S. Fansler Apr. 1974 73 p refs

(DA Proj. 1T0-61101-A-91A)

(AD-781496/5; BRL-1714) Avail: NTIS HC $4.25 CSCL 20/4

Similarity solutions for moving wall, two dimensional, incompressible boundary layer equations are reviewed and extended with the objective of using them as a family of velocity profiles in an approximate nonsimilar integral technique. (Modified author abstract) GRA

N75-12260# Advanced Technology Labs., Inc., Westbury, N.Y.

LEESIDE FLOW FIELD DESCRIPTION OVER CONES AT LARGE INCIDENCE Final Report, 1 Nov. 1972 - 28 Oct. 1973

Victor Zakkay and Edgar Alzner Apr. 1974 89 p refs

(Contract F33615-73-C-3010; AF Proj. 1366)

(AD-785369; ATL-TR-191; AFFDL-TR-74-19) Avail: NTIS CSCL 16/2

A semi-empirical analytic model for leeside flow field behavior over sharp circular cones at large incidence is described. The methodology involves replacement of the actual body by an inviscid equivalent body over which the flow field is developed. The equivalent body is selected by a combination of turbulent boundary layer analysis up to the primary separation point and correlation of available experimental results within the separated regions. The inviscid flow field over the equivalent body is developed by means of a numerical finite difference marching technique (Kutler program). Computer programs for implementing the analysis were developed and delivered to the AFFDL/FXG together with user's manuals. The performance of these programs is demonstrated by several numerical examples and comparisons with experiment. Author (GRA)

N75-12261# Rochester Applied Science Associates, Inc., N.Y.

INVESTIGATION OF VISCOUS LINE VORTICES WITH AND WITHOUT THE INJECTION OF CORE TURBULENCE Final Report

Andrew D. Zalay, Richard P. White, Jr., and John C. Balcerak Feb. 1974 159 p refs

(Contract N00014-71-C-0226)

(AD-785256; RASA-74-01) Avail: NTIS CSCL 01/1

An experimental research program was conducted to investigate the general characteristics of a line vortex trailed from a three-dimensional lifting surface, and to determine how its general velocity distribution, turbulence level, turbulent frequency content, and dissipation rates are affected by the injection of a jet of turbulent air and by a fixed turbulence generator. Three component hot-wire surveys indicated that injection of the vortex core reduced the peak tangential velocity, established a strong axial flow component, increased the core diameter, altered the turbulence spectrum, and enhanced the turbulence level in the viscous core. (Modified author abstract) GRA

N75-12262# Ballistic Research Labs., Aberdeen Proving Ground, Md.

ADDITIONAL TWO-DIMENSIONAL WAKE AND JET-LIKE FLOWS Final Report

James E. Danberg and Kevin S. Fansler Jul. 1974 12 p refs

(DA Proj. 1T1-61102-A-33D)

(AD-785522; BRL-1727) Avail: NTIS CSCL 20/4

A number of authors have described wake and jet-like similarity solutions to the steady, two-dimensional, laminar, incompressible boundary layer equations. These solutions are shown to be a subset of a larger class of solutions including those with algebraic velocity profile functions near the outer edge of the boundary layer. In addition to describing the relationship between solutions, the limiting cases are described in which the pressure gradient parameter becomes infinite and where the wall and edge velocities are equal. Author (GRA)

N75-12263# Purdue Univ., Lafayette, Ind.

CLUSTERING OF WATER ON HYDRATED PROTONS IN A SUPERSONIC FREE JET EXPANSION

J. Q. Searcy and J. B. Fenn Aug. 1974 34 p refs Prepared by Yale Univ.

(Contract N00014-67-A-0226-0006; NR Proj. 098-038; Proj. SQUID)

(AD-785284; SQUID-TR-YALE-6-PU) Avail: NTIS CSCL 07/4

Results are presented concerning size distribution and growth in the gas phase of ions in the series H(+)(H2O)sub n. The

measurements span a range of cluster sizes up to n = 28, a domain not previsously investigated quantitatively. The molecular beam sampling technique developed promises to be a powerful tool in the study of ion nucleation phenomenon. Note worthy observations include the unusual stability of the cluster with n = 21 and the absence of trapped molecules of carrier gas within a cluster. Author

N75-12264# ARO, Inc., Arnold Air Force Station, Tenn.
CLUSTER INTENSITY AND VELOCITY MEASUREMENTS IN CONDENSED FLOWS
A. B. Baily AEDC Sep. 1974 36 p refs
(AD-785348; ARO-VKF-TR-74-8; AEDC-TR-74-38) Avail: NTIS CSCL 20/4

The objective of the present investigation has been to obtain further information concerning the condensation process in expanding flows. To this end, molecular beams formed from expansions of argon, nitrogen, carbon dioxide, nitric oxide, krypton, and a 10% krypton/argon mixture have been analyzed with a quadrupole mass spectrometer and a metastable velocity analyzer. By varying the energy of the ionizing electrons, it has been found that (1) at low source pressures, it can be assumed that the measured dimer intensity corresponds to that occurring in the beam; and (2) at high source pressures, i.e., where massive condensation has occurred, the dimer signal is largely dependent on the energy of the ionizing electrons. The variation of the source pressure at which massive condensation occurs with source diameter and temperature has been summarized for argon and nitrogen. (Modified author abstract) GRA

N75-12265# Maryland Univ., College Park. Inst. for Molecular Physics.
DRAG FORCE ON OBJECTS IN THE NEARLY FREE MOLECULAR FLOW REGIME AS A FUNCTION OF SPEED RATIO Final Report, 15 Feb. 1973 - 14 Feb. 1974
Y. Y. Lin Wang and J. V. Sengers Sep. 1974 100 p refs
(Contract F40600-73-C-0006)
(AD-785351; AEDC-TR-74-79) Avail: NTIS CSCL 20/4

The drag coefficient of an object moving in a rarefied gas can be expanded in terms of the inverse Knudsen number. In the reported equation one term represents the drag coefficient in the free molecular flow limit. It is shown that a second coefficient is determined by a set of well defined collision integrals associated with sequences of successive collisions among two molecules and the object. These collision integrals are evaluated for a disc and a sphere assuming that the gas molecules are reflected diffusively by the object. The molecules are treated as hard spheres and the drag coefficient is studied as a function of the velocity of the object. (Modified author abstract) GRA

N75-12266# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
NONLINEAR THEORY OF A CARRYING SURFACE IN A NON-COMPRESSIBLE FLOW
S. D. Ermolenko and A. V. Rovnykh 5 Aug. 1974 18 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Sibirskoe Otd., Ser. Tekhn. Nauk (USSR), no. 3, 1970 p 12-21
(AD-785113; FTD-HC-23-1804-74) Avail: NTIS CSCL 20/4

A method for determining the performance of a lifting surface under incompressible flow conditions is presented. The procedure is based on calculating the wedging angles of the free vortices. An example of a symmetrical wing moving without slipping is developed. The intensity of the vortices are determined by the boundary conditions. Mathematical models are shown to support the theoretical considerations. The aerodynamic coefficients for various wing planforms under differing aerodynamic conditions are plotted in graph form. Author

N75-12267# Aerospace Corp., El Segundo, Calif.
CRYOGENIC COOLERS FOR SPACE SYSTEMS Final Report, Sep. 1973 - Jun. 1974
R. W. Vance 30 Jun. 1974 24 p refs
(Contract F04701-73-C-0074)
(AD-785083; TR-0074(4127-01)-1; SAMSO-TR-74-180) Avail: NTIS CSCL 13/1

The paper reviews the state of the art of small refrigerators that may be capable of performing in space with a high degree of reliability. Candidate cooling systems vary from open-cycle concepts for missions of short duration (up to one year) to mechanical concepts for missions that are projected to be operational for several years. Performance predictions for both types of concepts are described. Three mechanical systems are emphasized: the high-speed turbine concept, the heat-driven Vuilleumier (VM) concept, and the rotary reciprocating concept. The predictions and the factors that have impact on the acceptance of those predictions are discussed. Author (GRA)

N75-12268# Case Western Reserve Univ., Cleveland, Ohio. Dept. of Fluid Thermal and Aerospace Sciences.
DISTURBANCES IN A WALL BOUNDARY LAYER INTRODUCED BY AN ARRAY OF LOW-INTENSITY VORTICES Interim Report
Eli Reshotko and Harold L. Rogler Jan. 1974 330 p refs
(Grant AF-AFOSR-2577-74; AF Proj. 9781)
(AD-785394; FTAS/TR-74-95; AFOSR-74-0795TR) Avail: NTIS CSCL 20/4

To acquire insights into the role of freestream turbulence on laminar-turbulent transition, the interaction between arrays of single-wavenumber vortices convected at the mean freestream velocity is studied analytically and numerically. The boundary value problem consists of a nonhomogeneous, partial differential equation with forcing function depending on the mean flow and the freestream disturbances. The Orr-Summerfeld linear operator appears with phase speed unity and real wavenumber. The mathematical system is solved numerically via expansion in Chebyshev polynomials. Disturbance velocities, vorticity, energy, pressure, and Reynolds stresses were obtained over a range of the wavenumber, Reynolds number, vortex position relative to the plate, and skewing angle. Results are discussed. (Modified author abstract) GRA

N75-12269# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium). High Speed Lab.
EFFECT OF SHOCK IMPINGEMENT ON HEAT TRANSFER. PART 2: EFFECT OF SHEAR LAYER IMPINGEMENT ON PRESSURE AND HEAT TRANSFER RATE DISTRIBUTION AROUND A CYLINDER Interim Scientific Report, 1 Jan. - 31 Dec. 1973
Jean J. Ginoux and Richard D. Matthews Feb. 1974 39 p refs
(Grant AF-AFOSR-2147-71)
(AD-778962; VKI-TN-96-Pt-2) Avail: NTIS CSCL 20/4

Static pressure and the heat transfer rate distributions have been measured on the surface of a cylinder in supersonic flow. The cylinder bow shock was intersected by an extraneous oblique shock, the effect of which was to perturb the flow over the cylinder due to the interaction between the shear layer emanating from the intersection points of the shocks and the cylinder boundary layer. The position of this intersection, in relation to the free stream cylinder stagnation point, is shown to have a critical effect upon the pressure and heat transfer rate in the attachment region. Author (GRA)

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation*, and *19 Spacecraft Instrumentation*.

N75-12270* National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
SIGNAL CONDITIONER TEST SET Patent
Walter H. Houck and Jon D. Stigberg, inventors (to NASA) Issued 12 Nov. 1974 6 p Filed 30 Mar. 1973 Supersedes N73-23527 (11 - 14, p 1667)
(NASA-Case-KSC-10750-1; US-Patent-3,848,190; US-Patent-Appl-SN-346372; US-Patent-Class-324-158T; US-Patent-Class-324-60C) Avail: US Patent Office CSCL 14B

A system was developed for testing components contained in a signal conditioning module with a transistor and capacitor included in a circuit. The system includes a housing with a socket into which the module to be tested is plugged. A test switch is provided for selectively connecting a variable load to either a transistor or capacitor in the circuit for testing the operation. A signal generating circuit is provided for generating signals for use in testing the components of the module.
Official Gazette of the U.S. Patent Office

N75-12271* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
ULTRASONIC BONE DENSITOMETER Patent
James M. Hoop, inventor (to NASA) Issued 12 Nov. 1974 7 p Filed 8 Aug. 1973 Supersedes N73-30090 (11 - 21, p 2504)
(NASA-Case-MFS-20994-1; US-Patent-3,847,141; US-Patent-Appl-SN-386789; US-Patent-Class-128-2V; US-Patent-Class-73-67.1) Avail: US Patent Office CSCL 06B

A device, for measuring the density of a bone structure so as to monitor the calcium content, is described. A pair of opposed spaced ultrasonic transducers are held within a clamping apparatus closely adjacent the bone being analyzed. These ultrasonic transducers incude piezoelectric crystals shaped to direct signals through the bone encompassed in the heel and finger of the subject being tested. A pulse generator is coupled to one of the transducers and generates an electric pulse for causing the transducers to generate an ultrasonic sound wave which is directed through the bone structure to the other transducer. An electric circuit, including an amplifier and a bandpass filter couples the signals from the receiver transducer back to the pulse generator for retriggering the pulse generator at a frequency proportional to the duration that the ultrasonic wave takes to travel through the bone structure being examined.
Official Gazette of the U.S. Patent Office

N75-12272* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
APPARATUS FOR MICROBIOLOGICAL SAMPLING Patent
Judd R. Wilkins and Stacey M. Mills, inventors (to NASA) Issued 15 Oct. 1974 5 p Filed 24 Jan. 1973 Supersedes N73-16061 (11 - 07, p 0745)
(NASA-Case-LAR-11069-1; US-Patent-3,841,973; US-Patent-Appl-SN-326198; US-Patent-Class-195-127) Avail: US Patent Office CSCL 06M

An automatic apparatus is described for microbiologically sampling surface using a cotton swab which eliminates human error. The apparatus includes a self-powered transport device, such as a motor-driven wheeled cart, which mounts a swabbing motor drive for a crank arm which supports a swab in the free end thereof. The swabbing motor is pivotably mounted and an actuator rod movable responsive to the cart traveling a predetermined distance provides lifting of the swab from the surface being sampled and reversal of the direction of travel of the cart.
Official Gazette of the U.S. Patent Office

N75-12273* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
STRAIN GAUGE AMBIGUITY SENSOR FOR SEGMENTED MIRROR ACTIVE OPTICAL SYSTEM Patent
Charles L. Wyman and Thomas L. Howe, inventors (to NASA) Issued 22 Oct. 1974 5 p Filed 1 Feb. 1973 Supersedes N73-17563 (11 - 08, p 0923)
(NASA-Case-MFS-20506-1; US-Patent-3,842,509; US-Patent-Appl-SN-328792; US-Patent-Class-33-180R; US-Patent-Class-33-DIG.13; US-Patent-Class-350-292) Avail: US Patent Office CSCL 14B

A system is described to measure alignment between interfacing edges of mirror segments positioned to form a segmented mirror surface. It serves as a gauge having a bending beam with four piezoresistive elements coupled across the interfaces of the edges of adjacent mirror segments. The bending beam has a first position corresponding to alignment of the edges of adjacent mirror segments, and it is bendable from the first position in a direction and to a degree dependent upon the relative misalignment between the edges of adjacent mirror segments to correspondingly vary the resistance of the strain guage. A source of power and an amplifier are connected in circuit with the strain gauge whereby the output of the amplifier varies according to the misalignment of the edges of adjacent mirror segments. Official Gazette of the U.S. Patent Office

N75-12274 Association Aeronautique et Astronautique de France, Paris.
KING'S LAW COEFFICIENTS COMPUTATION METHOD FOR LINEARIZATION OF THE CONSTANT TEMPERATURE ANEMOMETER
Patrick Chassaing (Inst. de Mecan. des Fluides de Toulouse), Gerard Dourmes (Inst. de Mecan. des Fluides de Toulouse), and Jean Fabre (Inst. de Mecan. des Fluides de Toulouse) 1974 24 p In FRENCH; ENGLISH summary
(AAAF-NT-74-2) Avail: Assoc. Aeron. et Astronautique de France 10 F

Numerical calculation of the coefficient appearing in the cooling law of a hot wire anemometer is presented, using a least squares computation approach. An application is described for linearizers having a transfer function directly related to the above law. A full processing example is given. ESRO

N75-12275*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
NULLING DEVICE FOR DETECTION OF TRACE GASES BY NDIR ABSORPTION Patent Application
John Dimeff, inventor (to NASA) Filed 22 Nov. 1974 13 p
(NASA-Case-ARC-10760-1; US-Patent-Appl-SN-526438) Avail: NTIS HC $3.25 CSCL 14B

A nondispersive gas analyzing apparatus is described having a chamber for containing gas. An energy source is provided for passing radiant energy through the chamber. Means are also provided for modulating the radiant energy passing through the chamber by modulating the volume at the acoustic resonance frequency of the gas. Signal generating means including a second chamber for containing a gas which is heated by radiant energy emerging from the first chamber. A microphonic means responsive to the resulting pressurization in the second chamber is included for generating a signal. NASA

N75-12276*# National Aeronautics and Space Administration. Pasadena Office, Calif.
THERMOCOUPLE INSTALLATION Patent Application
Walter B. Powell (JPL), Lee R. Potter (JPL), and Kenton S. MacDavid, inventors (to NASA) (JPL) Filed 22 Nov. 1974 20 p
(Contract NAS7-100)
(NASA-Case-NPO-13540-1; US-Patent-Appl-SN-526450) Avail: NTIS HC $3.25 CSCL 14B

A thermocouple plug that can be installed in a rocket engine wall or other metal plate to measure transient temperatures was developed. A description of the device and drawings of the equipment are provided. The thermocouple wires are located in a pair of narrow holes that lie near the thermocouple end of a plug and the wires are welded to the region of the plug material that lies between the holes. NASA

N75-12277*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SYSTEMS STUDY OF AN AUTOMATED FIRE WEATHER DATA SYSTEM
Kenji Nishioka Oct. 1974 70 p refs
(NASA-TM-X-62402) Avail: NTIS HC $4.25 CSCL 14B

A sensor system applicable to an automated weather station was developed. The sensor provides automated fire weather data which correlates with manual readings. The equipment and methods are applied as an aid to the surveillance and protection of wildlands from fire damage. The continuous readings provided by the sensor system make it possible to determine the periods of time that the wilderness areas should be closed to the public to minimize the possibilities of fire. Author

N75-12278*# Chrysler Corp., New Orleans, La. Space Div.
DEVELOPMENT OF A BATTERY STATUS MONITOR Final Report
R. I. Zimmerman Jul. 1974 46 p
(Contract NAS9-13654)

(NASA-CR-140362; TR-EE-74-110) Avail: NTIS HC $3.75 CSCL 14B

A prototype battery status monitor system has been developed. The functions of the system are: (1) to provide the energy status of the battery, (2) to measure and transmit basic battery parameters, (3) to process these measurements required to determine abnormal functioning of the battery, and (4) to transmit warning signals of the abnormal condition along with a go/no go signal. The system was developed for use with the space shuttle. Author

N75-12279*# Lockheed Electronics Co., Houston, Tex. Aerospace Systems Div.

CORRELATION OF MISSIONS 191, 51M AND HELICOPTER PHOTOGRAPHY

B. A. Bryan and S. H. Tunnel Aug. 1972 43 p
(Contract NAS9-12200)
(NASA-CR-134289; EOD2876; TWP-72-004) Avail: NTIS HC $3.75 CSCL 14E

The data obtained during aerial photography flights using a helicopter are presented. The areas photographed are identified as three areas within Test Site 175: (1) Rosenberg, (2) Houston Ship Channel/Trinity Bay, and (3) the Somerville Dam. Data are presented in the form of charts. Reproductions of the aerial photographs are included. Author

N75-12280# Lockheed Missiles and Space Co., Palo Alto, Calif.

INSTRUMENT TO MEASURE RADIANT HEAT FLUXES

O. A. Geraschenko and S. A. Sazhina 1973 5 p refs Transl. into ENGLISH from Kosmich. Issled. Ukr. (Kiev), v. 3, 1973 p 62-66
Avail: NTIS HC $3.25; National Translation Center, John Crerar Library, Chicago, Ill. 60616

An absolute bilateral radiometer for measuring radiant heat fluxes is described. The instrument is a thermoelectric converter in which one of the elements is exposed to the stream to be measured and the compensation side is darkened and heated by an electric current. The equality of the energies delivered to the plates is checked by a sensor, a differential thermocouple, whose junctions are located on the exposed and shaded plates. A thermoelectric transducer performs the function of sensor and auxiliary wall through which a significant part of the thermal energy absorbed or being generated passes. A diagram of the principle and the construction are presented. Author

N75-12281# Lockheed Missiles and Space Co., Palo Alto, Calif.

DETERMINATION OF THE EFFICIENCY AND ANGULAR DIRECTIVITY OF COSMIC GAMMA RAY DETECTORS

S. V. Golenetskii, V. N. Ilinskii, and E. P. Mazets 6 Feb. 1974 9 p refs Transl. into ENGLISH from Kosmich. Issled., Akad. Nauk SSSR (Moscow), v. 12, no. 5, 1974 p 779-786
Avail: NTIS HC $3.25; National Translation Center, John Crerar Library, Chicago, Ill. 60616

A procedure for calibrating the scintillation detector for the gamma-spectrometer on the Kosmos-461 is examined. Values of the total efficiency of recording the gamma radiation, the photoefficiency, and the photofraction upon exposure of the detector to an isotropic and parallel flux are determined in a broad energy range. This method can be used also in the calibration of more complicated detectors which include the active and passive collimators and screens. The properties of the angular directivity of the detectors are considered. The possibility is shown of producing a system of detectors which would determine the direction to the radiation source to the accuracy of several degrees. Such a system can be used to investigate cosmic gamma-radiation flares. Author

N75-12282# Research Inst. of National Defence, Stockholm (Sweden).

SUMMARIZED RESULTS OF TESTS ON SINGER-KEARFOTT'S GYROFLEX GYRO [SAMMANFATTANDE RESULTAT AV TEST MED SINGER-KEARFOTTS GYRO-FLEXGYRO]

Peter Wolff Nov. 1972 8 p refs In SWEDISH
(FOA-2-A-2562-E4) Avail: NTIS HC $3.25

A summary of the operating and running tests made on gyroflex gyro C70965-7216-2 is reported. The results show the gyro functions completely in accordance with the purchaser's specification with the theoretical model put forward. This type of gyro could be approved as a completely developed and robust product well suited for IN-purposes. Author

N75-12283# Research Inst. of National Defence, Stockholm (Sweden).

RECORDINGS OF THE SPECTRAL-RADIO-METER SIGNE DURING THE SUMMER OF 1972 [REGISTRERINGAR MED SPEKTRORADIOMETERN 'SIGNE' UNDER SOMMAREN 1972]

Carl Hugo Agren Nov. 1972 22 p ref In SWEDISH
(FOA-2-C-2577-E1) Avail: NTIS HC $3.25

A technical description of the spectral radiometer is given that is intended for measuring at a distance. An account of its first recordings is presented together with its construction, calibration and operation. Practical problems in measuring are dealt with as well as different factors which effect measurements. In conclusion, a number of recordings are given of the spectral radiance and spectral reflections, mainly of vegetation and water. Author

N75-12284# Technische Universitaet, Hanover (West Germany).

THE EFFECT OF STOCHASTIC INTERFERENCES ON THE ACOUSTIC HOLOGRAPHIC IMAGERY OF OBJECTS Ph.D. Thesis [EIN BEITRAG ZUR AUSWIRKUNG STOCHASTISCHER STOERUNGEN AUF DIE AKUSTISCH-HOLOGRAPHISCHE ABBILDUNG VON OBJEKTEN]

Reiner Diehl 6 Feb. 1973 167 p refs In GERMAN
Avail: NTIS HC $6.25

The effect of an inhomogeneous medium in acoustic holographic imagery is studied by considering static isotropic-, time- and localized-fluctuations in the basic diffraction index. The wave equation at homogeneous propagation is considered to be the Helmholtz type and the phase velocity an accidental variable. An approximation method for the wave equation is selected that represents noise effects in acoustic pressure waves propagating from a point source by multiplication with log normal variables. The inhomogeneous propagation of the reconstructed image is determined for: (1) a source dependent reference wave; (2) a locally synthesized reference wave; (3) Fourier transformation holography; and (4) conventional imagery with monochromatic waves. Transl. by G.G.

N75-12285# Technische Universitaet, Hanover (West Germany).

MEASUREMENTS OF GAS COMPONENT AND DURATION TIME IN THE LIQUID PHASE OF TWO AND THREE COMPONENT SYSTEMS IN BUBBLE COLUMN REACTORS Ph.D. Thesis [GASANTEIL- UND VERTEILZEITMESSUNGEN IN DER FLUESSIGEN PHASE AN ZWEI- UND DREIPHASENSYSTEMEN IN BLASENSAEULEN-REAKTOREN]

Joern Todt 8 Feb. 1974 121 p refs In GERMAN
Avail: NTIS HC $5.25

Effective hydrodynamic values for relative gas component and time lag distribution in the liquid phase are obtained for various multiphase reactor systems as function of gas- and fluid-flow parameters. Considered are air-water systems of direct- and reverse-flows, a two phase direct flow cascade, and an air-water-hollow sphere system of reverse flow. Results indicate the multiple phase direct flow reactor as most optimal for continuous aerobic fermentation processes. Transl. by G.G.

N75-12286# Research Inst. of National Defence, Stockholm (Sweden).

APPARATUS FOR THE AUTOMATIC RECORDED WEIGHING OF FRAGMENTS [ANLAEGGNING FOER AUTOMATISK VAEGNING OCH REGISTRERING AV SPLITTER]

Gunnar Axelson, Erik Kock-Nommensen, and Sven Ludvigsson Mar. 1973 32 p ref In SWEDISH
(FOA-2-A-2568-D4) Avail: NTIS HC $3.75

An equipment is reported which automatically records the mass of sample fragments by using an electronic balance. The recordings are on punched tape. The mass of fragments can vary between 0.2 and 20 g and the accuracy of measuring the weight is 0.01 g. The maximum capacity of the equipment is, at present, 900 fragments/h. Author

N75-12287# Research Inst. of National Defence, Stockholm (Sweden).

A RELAXOMETER FOR POLYMER MATERIAL [RELAXOMETER FOER POLYMERA MATERIAL]
Tord Aredal Mar. 1973 18 p In SWEDISH
(FOA-4-C-4533-G2) Avail: NTIS HC $3.25

A recently produced relaxometer for measuring polymer material and test results is reported. The relaxometer works by compression and is mainly intended for measurements on rubber material and elastic plastics. Author

N75-12288# Research Inst. of National Defence, Sundbyberg (Sweden).
DIGITAL DATA COLLECTION WITH A/D-TRANSDUCER DEC AF01, TAPE PLAYER AMPEX FR1300 AND COMPUTER PDP-8/1 [DIGITAL DATAINSAMLING MED A/D OMVANDLARE DEC AF01, BANDSPELARE AMPEX 1300 OCH DATOR PDP-8/I]
Gunnar Blomqvist and Paul Stroem Jan. 1973 37 p refs In SWEDISH
(FOA-1-C-1497-D1) Avail: NTIS HC $3.75

Good quality measuring signals can often be digitized directly at the measuring position with advantage. The report gives a description of a data collecting system where a 14 channel analogue tape player can be used as the intermediate memory. This can later be transferred to a small computer for treatment. Author

N75-12289# Siemens A.G., Karlsruhe (West Germany).
BASIC RESEARCH IN SCANNING ELECTRON MICROSCOPY. [GRUNDLAGENFORSCHUNG AUF DEM GEBIET ELEKTRONENRASTERMIKROSKOPIE]
Bonn Bundesmin. fuer Forsch. und Technol. May 1974 58 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch. und Technol.
(BMFT-FB-T-74-09) Avail: NTIS HC $4.25; ZLDI, Munich 12,40 DM

The analytic possibilities of Auger electron spectroscopy for scanning electron microscopy were tested on an experimental apparatus with a two grid retarding potential. Scanning electron microscopy was tested in two ways, one using field emission guns and the other an Elmiskope 101. For individual titles, see N75-12290 through N75-12291.

N75-12290 Siemens A.G., Karlsruhe (West Germany).
APPLICATION OF AUGER ELECTRON SPECTROSCOPY TO ELECTRON PROBE MICROANALYSIS [UEBER DIE ANWENDUNG DER AUGER-ELEKTRONENSPEKTROSKOPIE BEI ELEKTRONENSTRAHL-MIKROANALYSE]
U. Weber *In its* Basic Res. in Scanning Electron Microscopy May 1974 41 p refs In GERMAN; ENGLISH summary (For availability see N75-12289 03-35)

The analytic possibilities of Auger electron spectroscopy for scanning electron microscopy were studied, using an experimental apparatus with a two grid retarding potential spectrometer. The intensity of the characteristic electron lines of several chemical elements versus the exciting primary beam current were determined. Measurements in conjunction with the signal to background ratio allow the calculation of the detection limit for the chemical elements. The object resolution of a scanning image which can be theoretically obtained with characteristic Auger electron signals was estimated. Author (ESRO)

N75-12291 Siemens A.G., Karlsruhe (West Germany).
ON THE SCANNING ELECTRON MICROSCOPY OF THIN SPECIMENS IN TRANSMISSION [UEBER DIE RASTER-ELEKTRONENMIKROSKOPIE AN DURCHSTRAHLBAREN PRAEPARATEN]
K. H. Herrmann *In its* Basic Res. in Scanning Electron Microscopy May 1974 18 p In GERMAN; ENGLISH summary (For availability see N75-12289 03-35)

The possibilities of scanning electron microscopy were tested in two ways. Based on previous work on a high resolution scanning transmission microscope, systems with field emission guns were tested. It was shown that treating the field emission gun with oxygen increases the brightness of the system. Using an Elmiskope 101 a resolution of about 3nm could be achieved. An energy-analyzer was built in, which allows analytical data of the specimen to be obtained by measuring the plasma losses of the irradiated areas. ESRO

N75-12292# Sandia Labs., Albuquerque, N.Mex.
LOW CONTRAST LONG LATITUDE DEVELOPER FOR HIGH RESOLUTION PLATES AND FILMS
C. E. Robertson Jun. 1974 6 p ref
(Contract AT(29-1)-789)
(SLA-74-97) Avail: NTIS HC $3.25

A combination of 1-phenyl-3-pyrazolidine, P-methylaminophenol sulfate, sodium sulfite, and sodium carbonate (designated DbX developer) forms a soft working developer especially useful with Kodak 649F and Agfa 10E75 plates used in holography. Gammas of 1.0 and less have been obtained with both plates. A Fourier transform filter has been constructed with 649F processed to a gamma of 1.0 in this developer. 10E75 processed to a gamma of 1.0 in this developer has been found to have a reconstruction efficiency of about 60 percent of that obtained with the same film processed in D-19 for 5 minutes at 70 F. The developed has also been found useful with Kodak Plus-X pan film producing low contrast and a long exposure latitude while maintaining a good tone speed. Author

N75-12293# CBS Labs., Stamford, Conn.
HOLO-SCANNER TECHNIQUE FOR WIDEBAND RECORDING Final Report, May - Dec. 1973
Charles Ih and David Kleinschmitt Jul. 1974 61 p
(Contract F30602-73-C-0310)
(AD-785396; RADC-TR-74-181) Avail: NTIS CSCL 14/5

The report describes the analysis, experimental development, and test of the new HoloFacet (TM) scanning technique for high speed optical scanning and recording of 100 lp/mm at 100 MHz on a high resolution photographic film. The HoloFacet scanning technique employs the rotation of a HoloFacet within a coherent optical field, such that the resulting diffracted waves are scanned across a film surface as a succession of rapidly moving focal points. The HoloFacets are applied by well-developed holographic means to a surface which reduces the optical perturbation of the high speed system. The report also describes the transformation of the brassboard holographic scanner into a recorder, for the purpose of yielding an output on a strip of photographic film permitting the analysis of the characteristics of wideband holograph recording, such as focusing accuracy, and tolerances. A 100 lp/mm was recorded on Type 3414 film at 33% MTF with a video bandwidth of 100 MHz and as canner speed of 52,000 rpm. (Modified author abstract) GRA

N75-12294# CAI, Barrington, Ill.
SAMPLE TEST REPORTS FOR CAMERA, STILL PICTURE, KA-91B
Aug. 1974 224 p refs
(Contract F33657-72-C-0672)
(AD-785399; CAI-2405-A012-1) Avail: NTIS CSCL 14/5

The report describes the Sample Test Program conducted on the Still Picture Camera, Type KA-91B. The testing program was conducted to prove that the camera meets military requirements of CAP-60166. Problems encountered were analyzed and corrected immediately. Sufficient retesting was performed to prove the validity of the correction. Details pertaining to these instances are included. Author (GRA)

N75-12295# Illinois Inst. of Tech., Chicago. Dept. of Mechanics Mechanical and Aerospace Engineering.
ON THE INTERPRETATION OF THE OUTPUT OF HOT-FILM ANEMOMETERS AND A SCHEME OF DYNAMIC COMPENSATION FOR WATER TEMPERATURE VARIATION
J. Tan-Atichat, H. M. Nagib, and J. W. Pluister Aug. 1973 55 p refs
(Grant AF-AFOSR-2509-73; AF Proj. 9781)
(AD-784912; IIT-Fluids/Heat-Transfer-R73-7; AFOSR-74-1343TR) Avail: NTIS CSCL 14/2

Using a special calibration tunnel developed during the course of this study, the static and dynamic response of several kinds of commercially available hot-film probes with single and multiple sensors of the cylindrical-fiber type are examined. The effects of different parameters, including those of the anemometer bridge, on the output and performance of the probes are evaluated. In particular, the consequences of variations in water temperature

on the hot-film anemometer output are determined. (Modified author abstract) GRA

N75-12044 Societe Nationale Industrielle Aerospatiale, Paris (France). Div. des Systemes Balistiques et Spatiaux.
RATIO OF AXIAL AND RADIAL STIFFNESS IN AN AXISYMMETRIC MAGNETIC BEARING [RAPPORT DES RAIDEURS AXIALE ET RADIALE DANS UN PALIER MAGNETIQUE A SYMETRIE DE REVOLUTION]
In its Design and Develop. of a Momentum Wheel with a Mainly Passive Magnetic Bearing, Phase 1, Vol. 2 31 May 1974 10 p In FRENCH (For availability see N75-12041 03-18)

N75-12503 Joint Publications Research Service, Arlington, Va.
INSTRUMENT FOR MEASURING THE CONCENTRATION OF CRYSTALLINE PARTICLES
A. G. Laktionov and N. K. Nikiforova *In its* Meteorology and Hydrol., No. 8, 1974 (JPRS-63560) 29 Nov. 1974 p 147-153 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 8, 1974 p 111-113 (For availability see N75-12488 03-47)

N75-12736* Massachusetts Univ., Amherst. Astronomy Research Facility.
BALLOON-BORNE INFRARED CORONAGRAPH
John Strong *In* NASA. Ames Res. Center Telescope Systems for Balloon-Borne Res. Nov. 1974 p 1-6 refs (For availability see N75-12735 03-74)
CSCL 20F

N75-12741* Groningen Rijksuniversiteit (Netherlands). Dept. of Space Research.
MULTICOLOUR FAR INFRARED PHOTOMETRY OF GALACTIC H2 REGIONS
Henk Olthof *In* NASA. Ames Res. Center Telescope Systems for Balloon-Borne Res. Nov. 1974 p 51-57 refs Sponsored by Royal Acad. of Sci. (For availability see N75-12735 03-74)
CSCL 14E

N75-12745* Rockwell International Corp., Canoga Park, Calif.
A BALLOON-BORNE CRYOGENICALLY COOLED FILTER RADIOMETER
Arthur G. DeBell *In* NASA. Ames Res. Center Telescope Systems for Balloon-Borne Res. Nov. 1974 p 91-106 Sponsored by ARPA (For availability see N75-12735 03-74)
CSCL 14B

N75-12746* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ULTRAVIOLET STELLAR SPECTROPHOTOMETRY FROM A BALLOON PLATFORM
Yoji Kondo and Curtis Wells *In its* Telescope Systems for Balloon-Borne Res. Nov. 1974 p 107-119 refs (For availability see N75-12735 03-74)
CSCL 14E

N75-12755* Lockheed Electronics Co., Inc., Azusa, Calif.
BALLOON-BORNE ULTRAVIOLET STELLAR SPECTROMETER: ACQUISITION, TRACKING AND COMMAND SYSTEMS
W. C. Gibson *In* NASA. Ames Res. Center Telescope Systems for Balloon-Borne Res. Nov. 1974 p 190-201 refs (For availability see N75-12735 03-74)
CSCL 14B

36 LASERS AND MASERS

Includes parametric amplifiers.

N75-12296*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
AIRBORNE VISIBLE LASER OPTICAL COMMUNICATIONS (AVLOC) EXPERIMENT
Nov. 1974 483 p refs
(NASA-TM-X-64894) Avail: NTIS HC $12.00 CSCL 20E
A series of optical communication experiments between a high altitude aircraft at 18.3 km (60,000 ft) and a ground station were conducted by NASA from summer 1972 through winter 1973. The basic system was an optical tracker and transmitter located in each terminal. The aircraft transceiver consisted of a 5-mW HeNe laser transmitter with a 30-megabit modulator. The ground station beacon was an argon laser operating at 488 nm. A separate pulsed laser radar was used for initial acquisition. The objective of the experiment was to obtain engineering data on the precision tracking and communication system performance at both terminals. Atmospheric effects on the system performance was also an experiment objective. The system description, engineering analysis, testing, and flight results are discussed. Author

N75-12297# Research Inst. of National Defence, Stockholm (Sweden).
ON THE POSSIBILITIES OF USING A LASER IN TRANSMISSION EQUIPMENT FOR SIGHTING MEASUREMENTS [OM MOEJLIGHETERNA ATT ANVAENDA LASER I TRANSMISSION-APPARATUR FOER SIKTMAETNINGAR]
A. P. Hain Mar. 1973 20 p refs Transl. into SWEDISH from Tr. Nauch.-Issled. Inst. Gidrometeorol. Priborostr. (USSR) In SWEDISH
(FOA-P-C-8362-M7) Avail: NTIS HC $3.25
The theoretical basis for equipment with reference to sighting measurements working with transmission meters, is discussed. The possibilities of using lasers instead of incandescent lamps as beam sources are analyzed. Certain practical results are reviewed. Author

N75-12298# Research Inst. of National Defence, Stockholm (Sweden).
EXPERIMENT WITH LASER COMMUNICATION [FOERSOEK MED LASERKOMMUNIKATION]
Lennart Holm and Barbro Lindeborg Nov. 1972 45 p refs In SWEDISH
(FOA-2-C-2575-E2) Avail: NTIS HC $3.75
The essential features of a laser communication link system are reported with brief references to the components. Some examples of laser communication link systems used in the laboratory are given. Finally there is an account of some laser communication link trials. Author

N75-12299# Research Inst. of National Defence, Stockholm (Sweden).
MEASUREMENT OF CO2-LASER RADIATION ATTENUATION IN THE ATMOSPHERE [MAETNING AV CO2 - LASERSTRALNINGS DAEMPNING I ATMOSFAEREN]
Kai Gullberg and Hans Olov Lindstrand Oct. 1972 10 p refs In SWEDISH
(FOA-2-C-2565-E3-E4-E6) Avail: NTIS HC $3.25
Atmospheric attenuation of CO2 laser beams at 10.6 micrometer wave length has been recorded during different weather conditions over a 3 km range. The attenuation values obtained reached 12.5 db/km for mist and rain. The results are confirmed by accounts given in current literature. Author

N75-12300# Research Inst. of National Defence, Stockholm (Sweden).
LASER CANE FOR THE BLIND
Lars Fornaeus Feb. 1973 7 p
(FOA-2-C-2595-H5) Avail: NTIS HC $3.25
The possibility to improve the ordinary white cane for blind people with modern miniaturized optronics is considered. Descriptions of a laser cane developed by the research institute are provided. Author

N75-12301# Defence Research Establishment Valcartier (Quebec).
MEASURE OF THE CHARACTERISTICS OF TEA CO2 AMPLIFIER AND EXPERIMENTAL STUDY OF THE PROPAGATION OF A LASER PULSE WITH AN EXPONENTIAL FRONT IN THE AMPLIFYING MEDIA AND ABSORPTION AT 10.6 MICRONS [MESURE DES CHARACTERISTIQUES D'UN AMPLIFICATEUR CO2 TEA ET ETUDE EXPERIMENTALE DE LA PROPAGATION D'UNE IMPULSION LASER A FRONT EXPONENTIEL EN MILIEU AMPLIFICATEUR ET ABSORBANT A 10.6 MUm]
J. L. Lachambre, J. Gilbert, M. Blanchard, and F. Rheault Mar.

1974 236 p refs In FRENCH; ENGLISH summary
(DREV-R-710/74) Avail: NTIS HC $7.50

An experimental evaluation of the performance of two types of double-discharge TEA CO2 amplifiers is presented. The amplifiers are used to study and observe the different characteristics of the propagation of an optical pulse with an exponential leading front in both the linear and saturated amplifying regime. The construction and operation of a Laflamme-type and Seguin-type double-discharge TEA CO2 amplifiers are presented. The small signal gain performance of these devices is compared and evaluated. Operation of these amplifiers in the saturated state allows the determination of the saturation parameter relative to the medium and leads to an evaluation of the radiative cross section of the considered transition. The realization of the single longitudinal mode TEA CO2 laser source is presented. The output pulse of this laser is then propagated in a five-pass amplifier that uses one of the previously described double-discharge devices. Pulse widening and superluminal velocity is observed and determined quantitatively. Finally a two-component medium is formed by a alternating TEA CO2 amplifiers with SF6-He absorbing cells. Author

N75-12302# California Univ., Livermore. Lawrence Livermore Lab.
TWO-DIMENSIONAL CALCULATIONS OF HIGH DENSITY LASER INDUCED FUSION: STUDY OF SYMMETRY AND TAYLOR INSTABILITY
G. B. Zimmerman and A. R. Thiessen 5 Oct. 1973 6 p refs Presented at Ann. Plasma Phys. Meeting of the Am. Phys. Soc., Philadelphia, 31 Oct. 1973 Sponsored by AEC
(UCRL-74926; Conf-731009-9) Avail: NTIS HC $3.25

The LASNEX fusion code is discussed. The code allows one to explore the effects of decoupling and preheat caused by nonequilibrium electron and photon distributions. By considering two spatial coordinates questions concerning symmetry, stability, and self-generated magnetic fields are studied. Some calculations using the LASNEX code are discussed. NSA

N75-12303# California Univ., Livermore. Lawrence Livermore Lab.
LASER SYSTEMS FOR LASER FUSION
R. R. Buntzen and C. K. Rhodes 15 Apr. 1974 16 p refs Presented at Topical Meeting on Technol. of Controlled Nucl. Fusion, San Diego, Calif., 16 Apr. 1974 Sponsored by AEC
(UCRL-75367; Conf-740402-41) Avail: NTIS HC $3.25

Unique lasers having specialized characteristics are required for the successful development of a laser fusion control power station. Development of a format by which new laser media and the corresponding systems concepts can be evaluated is begun. A "reference" laser fusion power plant design is adopted to estimate required laser system efficiencies. A hypothetical oxygen auroral line laser is used as a model to delineate the parameters effecting laser system performance. Author (NSA)

N75-12304# Sandia Labs., Albuquerque, N.Mex.
LASER PLASMA STUDIES WITH THE SANDIA FOUR-BEAM SYSTEM
P. J. Brannon, G. L. Cano, J. F. Cuderman, K. M. Glibert, J. J. Hohlfelder, E. D. Jones, M. A. Palmer, and J. E. Powell 1974 17 p refs Presented at 8th Intern. Quantum Elec. Conf., San Francisco, 10 Jun. 1974 Sponsored by AEC
(SLA-73-7064; Conf-740617-4) Avail: NTIS HC $3.25

Four-beam laser interaction experiments were conducted using CD sub 2 spheres at laser energies on target of 30 to 40 J/beam in a 0.97 nsec pulse. From 45 to 75% of the energy on target was absorbed depending upon the pellet size. Neutrons were observed coming from the walls. High energy electrons were directly observed with a magnetic spectrometer and assuming symmetric emission on the average account for less than or equal to a millijoule of the absorbed energy. Fast and slow groups of ions were seen in the expanding plasma, the fast group containing as much as 27% of the absorbed energy for 100 micrometer spheres. Average ion velocities approach 60,000,000 cm/sec. indicating the pellets expand substantially during the course of the heating pulse. NSA

N75-12305# Oak Ridge Y-12 Plant, Tenn.
INFLUENCE OF TOOL FEED (IN/REV) ON THE MACHINABILITY OF CO2 LASER OPTICS
J. B. Arnold, P. J. Steger, and T. T. Saito 1974 18 p refs Presented at ASTM Workshop, Boulder, Colo., 22 May 1974 (Contract W-7405-eng-26)
(Y-DA-5786; Conf-740524-2) Avail: NTIS HC $3.25

The influence of tool feed (in/rev) on reflectivity of diamond-machined surfaces was evaluated using materials (gold, silver, and copper) from which CO2 laser optics are primarily produced. Fifteen specimens were machined by holding all machining parameters constant except tool feed and allowing it to vary only by controlled amounts. Inspection results of the speicmens indicated that tool feeds significantly higher than 200 microinches per revolution produced detrimental effects on the machined surfaces. In some cases, at feeds as high as 500 microinches per revolution, visible scoring was evident. Those surfaces produced with tool feeds less than 200 microinches per revolution had little difference in reflectivity. Measurements indicated that their reflectivity existed in a range from 96.7 percent to 99.3 percent. Author

N75-12306# Illinois Univ., Urbana. Dept. of Electrical Engineering.
STUDY OF THE NEON-OXYGEN LASER UNDER HEAVY PARTICLE BOMBARDMENT M.S. Thesis
E. L. Seckinger 1974 105 p refs Sponsored by AEC
(COO-2007-45) Avail: NTIS HC $5.25

Experiments are described which explore the possibility of using a heavy particle external ionization source as the energy input or pump for the Ne-O2 laser. Also described are the electrically excited Ne-O2 laser and the theory behind its operation and the theory behind the heavy particle bombarded excited laser. The heavy particles consist of the alpha and lithium particles produced by the reaction of thermal neutrons on a boron-10 coating surrounding the plasma. Theoretical studies show that with the neutron flux that can be obtained in the TRIGA reactor these particles should cause lasing in the gas mixture if an optical cavity exists. No conclusive evidence was obtained, though, that showed lasing, but in a few instances possible lasing was suggested by indirect measurements. Author (NSA)

N75-12307# Los Alamos Scientific Lab., N.Mex.
LASER PULSE PROPAGATION CODE
B. B. Suydam Apr. 1974 14 p refs
(Contract W-7405-eng-36)
(LA-5607-MS) Avail: NTIS HC $3.25

A code is described which propagates an axisymmetric pulse of light through optical systems of many elements such as: (1) laser amplifiers, (2) lenses, apertures and telescopes, and (3) air gaps between elements. Full account is taken of diffraction, nonlinear laser gain and the self-focusing effects of a nonlinear refractive index. This report describes the algorithms used in the calculation, which appear now to have stabilized. Actual coding details and subroutines, which will probably remain in a state of flux so long as the code is active, are not discussed. Author (NSA)

N75-12308# California Univ., Livermore. Lawrence Livermore Lab.
CHARACTERIZATION OF SELF-FOCUSING MECHANISMS IN LASER MATERIALS Interim Final Report, 14 Feb. 1974
R. Hellwarth, J. Cherlow, and T. T. Yang 1974 24 p refs Prepared by Univ. of Southern Calif.
(UCRL-13597) Avail: NTIS HC $3.25

The time dependence of the nonlinear optical susceptibility tensor of fused quartz and the laser glasses ED-2 and LSO, C1020, and C2828 was studied. This will allow computation of any nonlinear optical effect involving frequencies below the electronic bandgap and above frequencies at which nuclear motions respond. The relative contributions of the electronic and nuclear nonlinearities to the self-focusing index for linearly polarized light in these glasses were determined; the electronic contribution dominates in each. The implications of these results for laser-material selection are discussed. Author (NSA)

N75-12309# California Univ., Livermore. Lawrence Livermore Lab.
PROSPECTS FOR LASER FUSION
J. H. Nuckolls 13 May 1974 6 p refs Presented at 8th

Intern. Quantum Elec. Conf., San Franciso, 10 Jun. 1974 Sponsored by AEC
(UCRL-75691; Conf-740617-3) Avail: NTIS HC $3.25

Four areas are summarized: critical problems in laser driven implosions; experimental results and comparison with computer calculations; laser requirements for breakeven, net energy production, and power plants; and estimated time scales.
Author (NSA)

N75-12310# California Univ., Berkeley. Lawrence Berkeley Lab.
LAMP CODE USERS GUIDE
P. F. Thompson 17 Jun. 1974 68 p refs
(Contract W-7405-eng-48)
(UCID-16525) Avail: NTIS HC $4.25

A radially symmetric, time-dependent laser propagation code that solves Maxwell's wave equation in either active or passive host media is presented. The method uses a parabolic approximation to the wave equation and employs a method of cubic spline interpolation in solving the wave equation that insures continuity of the first and second derivatives of the light field. Additionally, the code can describe linear propagation, nonlinear self-focusing, and saturable coherent gain or absorption that is governed by a homogeneously broadened two-level system. The code uses an adaptive axial space increment which is determined internally by the code to achieve an inputted percent amplitude of absolute increment in phase per axial space step. Author

N75-12311# Sandia Labs., Albuquerque, N.Mex.
LASER DOPPLER VELOCIMETRY IN CHEMICAL LASER STUDIES
C. E. Hackett and J. Waypa 1974 17 p refs Presented at LDV Conf., West Lafayette, Ind., 27 Mar. 1974 Sponsored by AEC
(SAND-74-5006; Conf-740337-1) Avail: NTIS HC $3.25

An experimental investigation of the gas kinematics in the mixing zone downstream of various supersonic nozzle arrays for use in chemical laser systems was conducted in the Chemical Laser Laboratory of the Air Force Weapons Laboratory (AFWL). The design considerations and experimental application of a scanning laser Doppler velocimetry (LDV) system for use in this investigation is reported. The problem of dielectric seeding of the low density supersonic gas streams was addressed and was in part circumvented by Lagrangian condensation reaction techniques. The LDV system incorporated a servo-driven scanning feature which enabled the Doppler sensing region to be swept in planes parallel to the face of the mixing nozzle array. Results were compared to hot-wire anemometry, and are found to be satisfactory. Author (NSA)

N75-12312# Naval Postgraduate School, Monterey, Calif.
METAL OXIDATION LASER Ph.D. Thesis
Leslie G. Murray Jun. 1974 73 p refs
(AD-784760; NPS-57CO-74061) Avail: NTIS

Experiments were conducted with the CO2-CH3N3 laser to determine if a chemical laser is feasible using a pumping scheme where energy released by photolysis of CH3N3 is used to create a population inversion in CO2. A metal oxide laser system was designed and constructed. The energy from an exothermic chemical reaction between a metal and an oxidizing gas was used to create a population inversion in the diatomic product molecules. The metal was vaporized using the exploding wire technique. The laser tube, resonant cavity, vacuum system, electrical control system and exploding wire circuit were designed and fabricated. Several experiments were performed using aluminum, copper and indium wire with oxygen gas. (Modified author abstract) GRA

N75-12313# United Aircraft Corp., East Hartford, Conn.
DYE TESTING AND EVALUATION PROGRAM Final Technical Report, 1 May - 31 Dec. 1973
Glenn O. Ladd, Jr. May 1974 93 p refs
(Contract F33615-73-C-1149; AF Proj. 6100)
(AD-784885; UARL-N921681-9; AFAL-TR-74-67) Avail: NTIS CSCL 20/t5

Optimization of the performance of laser dyes emitting in the range from 590 nm to 750 nm is investigated in the proprietary vortex stabilized flashlamp pumped dye laser developed by United Aircraft Research Laboratory. The long life and extremely repeatable output characteristics of the flashlamp permit an extended investigation for the purpose of comparing the performance of twenty dye-solvent combinations. The dyes evaluated were rhodamine 6G, rhodamine B, Kiton Red S, and cresyl violet nitrate which were prepared in a pure form by the Air Force Materials Laboratory. Another dye evaluated was Eastman Kodak No. 11885, oxazine perchlorate. Degradation tests were performed on the most efficient dye solvent combinations to determine their suitability for sustained operation. Author (GRA)

N75-12314# Naval Research Lab., Washington, D.C.
RESPONSE OF MATERIALS TO LASER RADIATION: A SHORT COURSE Summary Report
J. T. Schriempf 10 Jul. 1974 77 p refs
(NRL Proj. M01-26; RR0220146)
(AD-785010; NRL-7728) Avail: NTIS CSCL 20/5

A tutorial discussion of the response of materials to laser radiation is presented, with emphasis on simple, intuitive models. Topics discussed include optical reflectivity of metals at IR wavelengths laser-induced heat flow in materials, the effects of melting and vaporization, the impulse generated in materials by pulsed radiation, and the influence of the absorption of laser radiation in the blowoff region in front of the irradiated material. Author (GRA)

N75-12315# Naval Research Lab., Washington, D.C.
ARPA-NRL LASER PROGRAM Semiannual Technical Report, 1 Jul. - 31 Dec. 1973
J. R. Airey, L. Champagne, N. Djeu, W. H. Green, J. K. Hancock, M. C. Lin, F. ONeill, S. K. Searles, J. A. Stregack, W. S. Watt et al Jul. 1974 64 p refs Submitted for publication
(ARPA Order 2062; NRL Proj. 55N01-21; NRL Proj. R08-45)
(AD-785234; NRL-MR-2846) Avail: NTIS CSCL 20/5

The ARPA-NRL High Energy Laser Program is concerned with the development of laser technology in three project areas: Chemical Infrared Lasers, Electrical Infrared Lasers and Electronic State Lasers. The Chemical Infrared Laser Program is concerned with the development of the DF-CO2 supersonic transfer chemical laser, the study of the CO vibrational distribution from exothermic reactions which produce CO and the measurement of energy transfer rates of CO. The objective of the DF-CO2 program is the chemical augmentation of gasdynamic CO2 lasers. V-V and V-R, T energy transfer rates have been measured for CO-additive mixtures and the temperature dependence of some of these rates has been investigated. The Electrical Infrared Laser Program consists of two primary projects, short-pulse CO2 laser technology and electric-discharge gasdynamic lasers (EDGDL). Advances in pulse switch out technology and measurements of gain profiles and spectral content are reported. Components for an EDGDL apparatus for the investigation of the D2(*) - HCl transfer laser have been fabricated and are being assembled. (Modified author abstract) GRA

N75-12316# Informatics, Inc., Rockville, Md.
EFFECTS OF HIGH POWER LASERS, NO. 3 Technical Report, Jan. - Mar. 1974
Stuart Hibben 7 Jun. 1974 66 p refs
(Contract F44620-72-C-0053; ARPA Order 1622)
(AD-785401; AFOSR-74-1440TR) Avail: NTIS CSCL 20/5

This is a compilation of abstracts of Soviet studies on high power laser technology that were published in the first quarter of 1974. Material on this subject for the previous year has appeared in the monthly Selected Material from Soviet Technical Literature for 1973, now discontinued. Articles were selected as the most pertinent from the total list of attached bibliographic entries. They are grouped by laser interaction with metals, dielectrics, semiconductors, miscellaneous targets, and laser-plasma interaction. A first-author index and an index of source abbreviations are appended. GRA

N75-12317# Hughes Research Labs., Malibu, Calif.
FREQUENCY TUNED CO2 LASER Final Technical Report, 19 Mar. 1973 - 30 Jun. 1974
R. L. Abrams and M. B. Klein Aug. 1974 107 p refs
(Contract N00014-73-C-0324; ARPA Order 1809)
(AD-785180) Avail: NTIS CSCL 20/5

The program represents an effort to exploit the advantages of waveguide laser technology for the development of advanced components suitable for optical radar applications. These include a CO2 laser local oscillator, tunable plus or minus 750 MHz from line center for heterodyne detection of doppler shifted signals, and an intermediate level power amplifier. A parametric study of tunable waveguide lasers is described in which tube geometry, gas mixture, and mirror mount design were all varied to determine the optimum design for frequency tunability and stability. The final device consists of a 1.0-mm square by 9.5-cm long waveguide laser with 80 mW output power, 1.2 GHz tunability, and 10 kHz short term frequency stability. A 1.65 mm i.d. x 1 m waveguide amplifier test bed was constructed with an active gain length of 77 cm. The authors discuss the specific trade-offs involved in designing a full scale device which achieves the required output power and bandwidth. (Modified author abstract) GRA

N75-12318# Naval Research Lab., Washington, D.C.
ANALYSIS OF VUV AND X-RAY LASERS PUMPED BY A TRAVELING-WAVE SOURCE Interim Report
Paul P. Bey Jul. 1974 21 p refs
(NRL Proj. 65N01-33)
(AD-784995; NRL-MR-2847) Avail: NTIS CSCL 20/5

A numerical analysis is made to account for the intensity of amplified spontaneous emission (ASE) as a function of the length of the amplifying medium pumped by a traveling-wave photon source. Details of the analysis are given for sodium vapor at 372 A pumped by a broad band traveling-wave photon source. A calculation is also included to determine the feasibility of producing ASE at 372 A with a 100 eV black-body like source produced, for example, by an exploding wire. Results indicate that ASE is not feasible with exploding wire technology unless the presently available intensity or rise time can be improved by a factor of ten. Results are also given for amplifying K alpha emission from aluminum and copper at 7.84 A and 1.54 A, respectively. (Modified author abstract) GRA

N75-12319# Naval Research Lab., Washington, D.C.
HIGH ENERGY LASER WINDOWS Semiannual Report, 1 Jan. - 30 Jun. 1974
R. W. Rice 30 Jun. 1974 104 p refs
(ARPA Order 2031)
(AD-784991; SAR-4) Avail: NTIS CSCL 20/5

Contents: Characterization of strontium-doped kcl forgings; Crack propagation in kcl; 10.6 micrometer irradiation damage in press forged kcl; Fracture of ZnSe and As2S3; Theory of intrinsic multiphonon absorption and comparison with experiment; Impurity effects on vacuum ultraviolet and infrared multiphonon spectra of laser window materials; Surface finishing of fluoride laser windows; Spectral emittance studies of surface and bulk absorption; New instrumentation; Separation of surface and bulk absorption in laser calorimetry. GRA

N75-12320# Sperry Rand Corp., Great Neck, N.Y. Gyroscope Div.
FIBER COUPLED LASER ILLUMINATOR Summary Final Report, May 1972 - Aug. 1974
Philip J. Peluso, William Peters, and Arthur P. Stoliar Aug. 1974 43 p
(Contract F33615-72-C-1341; AF Proj. 6100)
(AD-785146; SGD-4224-0801; AFAL-TR-74-185) Avail: NTIS CSCL 20/5

The report describes the effort associated with the development and test of a room temperature Injection Laser Illuminator employing fiber optics. The use of fiber optics provides the means whereby essentially a point source aperture can be attained. The work effort associated with the design was concerned with fiber optics, array technology and electronics. The fiber optics effort consisted of developing polishing and coupling techniques along with production techniques. The array technology effort demonstrated the feasibility of assembling 66 fiber coupled diodes into one segment in conjunction with the associated modulator, driver, and cooling unit. The electronics effort demonstrated that charging and driving circuits performed successfully along with thermoelectric control circuits. (Modified author abstract) GRA

N75-12321# Environmental Research Inst. of Michigan, Ann Arbor.
ROTATIONAL RELAXATION MEASUREMENTS AND RESONANT PHENOMENA IN LASER-EXCITED HYDROGEN FLUORIDE Final Report, 1 Mar. 1973 - 28 May 1974
G. H. Lindquist, L. M. Peterson, and C. B. Arnold Jun. 1974 56 p refs
(Contract DAAH01-73-C-0591; ARPA Order 1180)
(AD-784952; ERIM-101300-18-F) Avail: NTIS CSCL 07/4

Rates for the transfer of rotational energy (R-R) in vibrationally excited HF gas were measured using a single laser pump-probe technique. The relaxation time was found to be inversely proportional to HF pressure in the mTorr range and the self-relaxation rate constant was determined. Rotational relaxation of HF gas due to the presence of additive gases was observed. The relaxation rate for H2 was measured. The temporal evolution of HF laser pulses was examined and compared with the vibrational fluorescence of the laser discharge and the temporal gain of the discharge. The importance of hydrogen in the discharge is discussed. Reported observations of several resonant processes include bleaching, self-induced transparency, optical nutations, and an anomalous increase of 40 in the refractive index. (Modified author abstract) GRA

N75-12322# Aerospace Corp., El Segundo, Calif. Lab Operations.
EXPLORATORY STUDIES OF DIFFUSION LASER MODIFICATIONS Interim Report
Donald J. Spencer 15 Aug. 1974 24 p refs
(Contract F04701-74-C-0075)
(AD-785400; TR-0075(5240-10)-2; SAMSO-TR-74-196) Avail: NTIS CSCL 20/5

The report is a summary of three exploratory studies of the gas composition modification in a conventional continuous-wave HF (DF) chemical diffusion laser. Experiments were performed in the Aerospace diffusion laser test facilities. The substitution of HB r fuel for H2, DF/CO2 transfer performance in a triple-slit nozzle array, and CO2 mixing laser performance with the triple-slit nozzle used were of concern in these experiments. GRA

N75-12323# Rome Air Development Center, Griffiss AFB, N.Y.
LASER BACKSCATTER CHARACTERISTICS OF MATERIALS OF INTEREST IN BALLISTIC MISSILE DEFENSE (BMD)
Fred J. Demma, James H. Michels, Eugene Bromley, and Albert F. Morreall Jul. 1974 113 p
(AD-785393; RADC-TR-74-1) Avail: NTIS CSCL 15/3

A series of measurements were conducted on laser backscatter characteristics of materials of interest in Ballistic Missile Defense (BMD). The data taken was reduced for the purposes of describing the reflectance of reentry vehicles (RV), decoy, and tank fragment materials. As evidenced by the experimental data, a wide variety of scattering was encountered from BMD targets. Specifically, whether or not the material was metallic, painted, sealed, overcoated, surface roughed, or non-metallic produced scattering that ranged from diffraction limited (so-called specular) to perfectly Lambertian (so-called diffuse). The significant impact of the physical characteristics (type of material/finish) of a BMD target on its backscatter has been experimentally determined by this study. At this time, both material characteristics and shape appear equally important in determining the laser backscatter characteristics of BMD targets. Author (GRA)

N75-12324# ARO, Inc., Arnold Air Force Station, Tenn.
APPLICATION OF A DUAL BEAM LASER VELOCIMETER TO TURBULENT FLOW MEASUREMENTS Final Report, 1 Jul. 1972 - 30 Jun. 1973
V. A. Cline and H. T. Bentley, III AEDC Sep. 1974 44 p refs
(AD-785352; AEDC-TR-74-56) Avail: NTIS CSCL 14/2

A dual beam laser velocimeter (LV) system has been applied to the measurements of mean velocity and turbulence intensity. The basic theory of the LV is described in terms of both Doppler and fringe models. A statistical analysis predicting the number of data points required to ensure a given accuracy is developed. Experimental verification of the analysis is given. A theoretical analysis of the LV counting process is proposed which predicts the biases to be found in velocity and turbulent intensity estimators. The two most common methods of averaging are compared for biases in the estimators for a one-dimensional

model. Finally, experimental LV data are presented, taken from a coaxial free-jet-mixing facility. (Modified author abstract) GRA

N75-12325# Texas Instruments, Inc., Dallas. Central Research Labs.
MONOLITHIC LASER Annual Technical Report, 1 May 1973 - 30 Apr. 1974
F. A. Blum, K. L. Lawley, R. K. Watts, F. H. Doerbeck, and W. C. Scott Jun. 1974 56 p refs
(Contract N00014-73-C-0288; NR Proj. 215-220; RF41423001)
(AD-785021; IT-08-74-46) Avail: NTIS CSCL 20/5

This report describes research to develop the first prototype integrated optical transmitter. The effort has involved the development of a unique (Ga,In)As surface laser and high index infrared glass waveguides. Ternary alloy Ga(1-x)In(x)As mesas with 0 = x - 0.2 have been grown and the details of their morphology determined. Also, a GaAs mesa diode laser was successfully fabricated. The p-n junction was formed by Zn diffusion into the top of the mesas. The diode mesa laser is the first monolithic, nondiscrete injection laser ever made. It is the only diode laser ever completely fabricated (including optical cavity formation) monolithically using conventional photolithographic fabrication technology. Finally, high quality chalcogenide glass optical waveguides have been developed. Losses as low as 0.4 db/cm were measured in sputtered As2S3 films. Channel optical stripline waveguides were fabricated by overlaying photoresist strips on the glass films. Low-loss channel waveguiding was observed in these structures. (Modified author abstract) GRA

N75-12841 Joint Publications Research Service, Arlington, Va.
DEVELOPMENT OF LASER TECHNOLOGY
Herman Klejman *In its* Transl. on Eastern Europe: Sci. Affairs, no. 438 (JPRS-63447) 15 Nov. 1974 p 45-64 Transl. into ENGLISH from Elektron. (Warsaw), no. 7-8, Jul.-Aug. 1974 p 333-341 (For availability see N75-12836 03-81)

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N75-12326* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
METHOD OF MAKING AN EXPLOSIVELY WELDED SCARF JOINT Patent
Lawrence J. Bement, inventor (to NASA) Issued 22 Oct. 1974 4 p Filed 1 Nov. 1972 Supersedes N73-14480 (11 - 05, p 0552)
(NASA-Case-LAR-11211-1; US-Patent-3,842,485; US-Patent-Appl-SN-302681; US-Patent-Class-29-470.1; US-Patent-Class-29-475) Avail: US Patent Office CSCL 13H

A method is presented for obtaining a bond joint between thin metal members without the addition of a bonding agent. The method yields bond strengths comparable to the parent metal. The method comprises overlapping the materials at the edges and bonding them by explosive welding while also making use of the explosive force to shape the materials into an essentially planar configuration. Official Gazette of the U.S. Patent Office

N75-12327# Technische Universitaet, Munich (West Germany).
CONTRIBUTION TO THE EXACT DETERMINATION OF THE NOTCH FACTOR IN SCREWED NUT JOINTS Ph.D. Thesis [BEITRAG ZUR GENAUEREN BESTIMMUNG DES KERBFAKTORS VON SCHRAUBEN-MUTTER-VERBINDUNGEN]
Juergen Schmidt Jul. 1973 153 p refs In GERMAN
Avail: NTIS HC $6.25

Numerical and experimental studies of the effects of side loads on stress concentration in the notch zone are used to determine the notch factor value and fatigue life predictions for screwed nut joints exposed to long duration oscillations. Transl. by G.G.

N75-12328*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
A SELF-LUBRICATING BEARING Patent Application
Ann F. Whitaker, inventor (to NASA) Filed 11 Nov. 1974 11 p
(NASA-Case-MFS-23009-1; US-Patent-Appl-SN-522557) Avail: NTIS HC $3.25 CSCL 13I

An improved bearing structure is described which includes a permanently magnetized porous body filled with an interstitial magnetic lubricant for extending the operational life of self-lubricating bearings. The bearing structure is characterized by a permanently magnetized retainer formed of a porous material and filled with an interstitial magnetic lubricant, whereby the pores serve as lubricant reservoirs from which the lubricant continuously is delivered to a film disposed between contiguous bearing surfaces. NASA

N75-12329*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
REFINEMENT IN BLACK CHROME FOR USE AS A SOLAR SELECTIVE COATING
Glen E. McDonald Washington Dec. 1974 10 p refs
(NASA-TM-X-3136; E-8116) Avail: NTIS HC $3.25 CSCL 11C

Black chrome is significant as a solar selective coating because the current extensive use of black chrome in the electroplating industry as a durable decorative finish makes black chrome widely available on a commercial scale and potentially low in cost as a solar selective coating. Black-chrome deposits were modified by underplating with dull nickel or by being plated on rough surfaces. Both of these procedures increased the visible absorptance. There was no change in the infrared reflectance for the dull-nickel - black-chrome combination from that reported for the bright-nickel - black-chrome combination. However, the bright-nickel - black-chrome coating plated on rough surfaces indicated a slight decrease in infrared reflectance. As integrated over the solar spectrum for air mass 2, the reflectance of the dull-nickel - black-chrome coating was 0.077, of the bright-nickel - black-chrome coating plated on a 0.75-micron (30-microinch) surface was 0.070, of the bright-nickel - black-chrome coating plated on a 2.5 micron (100-microinch) surface was 0.064. The corresponding values for the bright-nickel - black-chrome coating on a 0.0125-micron (0.5-microinch) surface, two samples of black nickel, and two samples of Nextrel black paint were 0.132, 0.123, 0.133, and 0.033, respectively. Author

N75-12330*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
OPERATING CHARACTERISTICS OF 120-MILLIMETER-BORE BALL
Erwin V. Zaretsky, Eric N. Bamberger (General Electric Co., Cincinnati), and Hans Signer (Industrial Tectonics, Inc.) Washington Nov. 1974 31 p refs
(NASA-TN-D-7837; E-7875) Avail: NTIS HC $3.75 CSCL 13I

A parametric study was performed with split inner-race 120-mm-bore angular-contact ball bearings at a speed of 25,000 rpm (3 million DN) at initial contact angles of 20 deg and 24 deg. Provisions were made for outer- and inner-race cooling and for injection of lubricant into the bearing through a number of radial holes in the split inner-race of the bearing. Oil flow and coolant rate to the bearing was controlled and varied for a total up to approximately 3.2 gal/min. Bearing temperature was found to decrease as the total lubricant flow to the bearing increased. However, at intermediate flow rates temperature began to increase with increasing flow. Power consumption increased with increasing flow rate. Bearing operating temperature, differences in temperatures between the inner and outer races, and bearing power consumption can be tuned to any desirable operating requirement. Cage speed increased by not more than 2 percent with increasing oil flow to the inner race. Author

N75-12331# Defence Standards Labs., Maribyrnong (Australia).
CALIBRATION OF THE DSL 50 TON-FORCE (500 kN) SINGLE-LEVER PRIMARY STANDARD OF FORCE
F. J. Brown and D. J. Hatt Jun. 1974 19 p refs
(DSL-551) Avail: NTIS HC $3.25

The DSL 50 ton-force (500 kN) primary standard of force is a single lever device which is calibrated by means of a specially developed calibrating loop and calibrating weights. The

weights are chosen so that their ratio corresponds to the nominal lever ratio of 50:1. Although the calibration of the lever was similar to previous calibrations, a different estimate of the lever accuracy was made. Results are given and discussed.
Author

N75-12332# Technische Universitaet, Hanover (West Germany).
CALCULATION OF BEARING LOADS AND DISPLACEMENT PATHS IN FAST RUNNING HIGH PERFORMANCE DIESEL ENGINES AT DIFFERENT POINT LOADS WITH EMPHASIS ON SPEED DROP Ph.D. Thesis [BEITRAG ZUR BERECHNUNG DER LAGERBELASTUNGEN UND VERLAGERUNGS BAHNEN SCHNELLAUFENDER HOCHLEISTUNGS-DIESELMOTOREN BEI VERSCHIEDENEN LASTPUNKTEN, INSBESONDERE BEI DREHZAHLDRUECKUNG]
Herrn Heinrich Moehlenkamp 6 Feb. 1974 185 p refs In GERMAN
Avail: NTIS HC $7.00
A system of differential equations is formulated for calculating the thermodynamic cylinder pressure profile according to the Runge Kutta method. Caloric values are determined as functions of temperature and air flow, displacement effects, loads on friction bearings, and by estimating the acceleration forces of the lubricating film at constant radial piston motion. Transl. by G.G.

N75-12333# Research Inst. of National Defence, Stockholm (Sweden).
SKIDPROOF DYES FOR CONCRETE AND ASPHALT [HALKFRI FAERG TILL BETONG-OCH ASFALTUNDER-LAG]
Rolf Pettersson Feb. 1973 34 p refs In SWEDISH Original contains color illustrations
(FOA-2-C-2592-E6) Avail: NTIS HC $3.75
Painting concrete and asphalt often results in a lowering of the dry and/or wet friction. By adding about 6% ground quartz, the coefficient of friction is considerably increased. The surface to be covered uses in addition, about 7% of 30 micro meter SiO2. By this means the coefficient of friction obtained for the dyed layer in the wet or dry condition rises accordingly from about 0.6 to 1.2. Other factors, e.g. the binding medium, application technique, consistency of dye, proportion of pigment and surface structure have been shown to have great significance. A connection between the choice of vertical profile and the value of the coefficient of friction has been obtained using the dynamometer method.
Author

N75-12334*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
PERFORMANCE AND DURABILITY OF IMPROVED AIR-ATOMIZING SPLASH-CONE FUEL NOZZLES
Robert D. Ingebo and Carl T. Norgren Washington Dec. 1974 23 p refs
(NASA-TM-X-3156; E-8082) Avail: NTIS HC $3.25 CSCL 20D
An improved design of air-atomizing fuel nozzles was determined from a study of four differently shaped splash-cone fuel nozzles after 56 hr of durability testing in a combustor segment. Test conditions included fuel-air ratios of 0.008 to 0.018, inlet-air total pressures of 41 to 203 N/cm, inlet-air temperatures of 477 to 811 K, and a reference velocity of 21.3 m/sec. Flat-tip fuel nozzles showed the least erosion damage and at a combustor operating condition of 700 K and 101 N/sq cm an oxides-of-nitrogen emission index of 12 and a smoke number of approximately 18 with a fuel-air ratio of 0.018. Emission indices for carbon monoxide and unburned hydrocarbons were 44 and 16, respectively, at simulated idle conditions of 477 K and 41 N/sq cm.
Author

N75-12335# Sandia Labs., Albuquerque, N.Mex.
SOLDERING LARGE AREA JOINTS IN VACUUM
G. J. Hof May 1974 25 p refs
(Contract AT(29-1)-789)
(SLA-73-1075) Avail: NTIS HC $3.25
A one-inch square solder joint with a minimum of voids and flux pockets was required for hybrid microcircuit to a KOVAR heat sink attachment for heat dissipation beyond ceramic substrate capability. Solder could not be fed into this particular joint by capillary action as is normally done. It was necessary to precoat joint surfaces with flux and preposition a 0.004 in. thick gold solder form. A vacuum atmosphere to aid removal of trapped air and flux gases, while flowing the solder by heating, was most successful in producing nearly void free and flux free joints. Solder alloys tested were Pb-In, Sn-Pb, and Au-Sn.
Author (NSA)

N75-12336# Sandia Labs., Albuquerque, N.Mex.
THE 20,000-RPM CENTRIFUGE
J. R. Kannolt Jun. 1974 48 p refs
(Contract AT(29-1)-789)
(SLA-74-204) Avail: NTIS HC $3.75
This centrifuge was specifically designed to actively test fire sets in spin environments of up to 20,000 rpm. Many problems unique to this type of testing were encountered and solved resulting in a versatile spin test system. With minor design changes the upper speed limit could be increased to 25,000 rpm. The safety features and portability allow moving this centrifuge to the area where needed thereby assuring maximum use of this new spin test facility.
Author

N75-12337# Naval Academy, Annapolis, Md.
DEVELOPMENT OF AN IMPROVED TECHNIQUE FOR FORMING ACRYLIC SPHERES
21 May 1974 88 p refs
(AD-784113; USNA-TSPR-54) Avail: NTIS CSCL 13/10
The NEMO hull, a transparent, acrylic plastic pressure capsule has replaced the steel hull in the underwater exploration in 1956. An acrylic plastic hull has been fabricated and tested at the U. S. Naval Academy's Laboratory for limited operations and with simpler process and it is a less expensive design. Eight preliminary 16-inch diameter test hemispheres were blown and measured to determine the validity of the method. This technical paper gives detailed information and data about the improved acrylic sphere's fabrication and the technique of the process.
Author

N75-12338# Curtiss-Wright Corp., Wood-Ridge, N.J.
DESIGN AND DEVELOPMENT TESTING OF FREE PLANET TRANSMISSION CONCEPT Final Report, 26 Jun. 1972 - 31 Dec. 1973
Neil A. DeBruyne Apr. 1974 90 p refs
(Contract DAAJ02-72-C-0113)
(AD-782857/7; CW-WR-73-040; USAAMRDL-TR-74-27) Avail: NTIS HC $4.75 CSCL 01/3
An experimental program to demonstrate and evaluate the Curtiss-Wright free planet concept for power transmission. The program consisted of designing a 500-horsepower speed reducer to operate at 8000 rpm input speed and 19.2425 reduction ratio. This design was procured and evaluated. The evaluation consisted of static and dynamic evaluations as well as 50 hours of endurance testing at rated operating conditions. (Modified author abstract)
GRA

N75-12339# Franklin Inst. Research Labs., Philadelphia, Pa.
THIN FILM RESEARCH AND DEVELOPMENT Final Report
Peter S. Francis, Thomas I. Haigh, and Florence L. Serafin Apr. 1974 24 p refs
(Contract DAAD05-71-C-0422)
(AD-779389; FIRL-F3120-10; LWL-CR-06P72C) Avail: NTIS CSCL 11/3
The objective of the effort was to investigate materials and techniques for applying antireflectance coatings having the properties of good adhesion and scratch resistance to acrylic plastics. The acrylic plastic used in helicopter windshields has a high degree of reflectivity of the impinging sun's light rays. This is a major threat to helicopter survivability since these rays are readily observed by enemy ground personnel. Author (GRA)

N75-12340# Naval Ship Research and Development Center, Annapolis, Md.
ROLAMITE ROLLING-GATE VALVES
Richard A. Milroy Sep. 1974 38 p refs
(AD-785229; NSRDC-4407) Avail: NTIS CSCL 13/11
A manually operated rolamite valve was evaluated. Although it worked well, it was discovered that it is much simpler to use a pilot to control the rolamite motion fluidically. Depending on the arrangement of the pilot, the rolamite valve could be operated

as a pressure regulator, back-pressure regulator, flow controller, or remote-control valve. With floating rollers, the rolamite valve also worked as a steam trap. Rolling-gate valves, using high-strength porous material to support the gate and quietly throttle the fluid, have many advantages. The use of a rolamite appears to be an excellent means for constructing a rolling-gate valve. Author (GRA)

N75-12341# General Motors Corp., Indianapolis, Ind. Detroit Diesel Allison Div.
EXPLORATORY INVESTIGATION FOR REDUCING LABYRINTH SEAL LEAKAGE IN HIGH PRESSURE RATIO GAS TURBINES Final Report, 1 Aug. 1972 - 31 Aug. 1973
H. L. Stocker Sep. 1973 140 p refs
(Contract N00140-73-C-0005)
(AD-781005/4; DDA-EDR-7968) Avail: NTIS HC $5.75 CSCL 11/1

The attendant problem of labyrinth seal air leakage in current and advanced high pressure ratio gas turbines is directly related to the limitations of current gas turbine dynamic seal technology. A method of improving the efficiency of labyrinth seals which does not violate mechanical design constraints involves increasing the internal cavity turbulence of the seal. Therefore, an exploratory investigation was undertaken to conceive, design, fabricate, and test several unique labyrinth seal configurations. (Modified author abstract) GRA

N75-12342# Harry Diamond Labs., Washington, D.C.
FIBER OPTIC SEALS: IMPROVED SEAL ASSEMBLIES AND INSPECTION EQUIPMENT FOR FIELD USE IN INTERNATIONAL SAFEGUARDS AND ARMS CONTROL APPLICATIONS
R. R. Ulrich Jul. 1974 28 p refs
(AD-785540; HDL-TR-1669) Avail: NTIS CSCL 11/1

In 1971 the Harry Diamond Laboratories developed for the U.S. Arms Control and Disarmament Agency a prototype model of a portable safing system that uses fiber optic seals and assembles, photographs, and identifies them in the field. The safing system provides a tamper-resistant/tamper-indicating seal that can be nondestructively identified in the field. Such seals are needed for the effective use of containment as a safeguards technique and for the protection of unattended instruments used for surveillance at peaceful nuclear facilities. This report describes an improved fiber optic seal assembly and associated equipment designed to meet these needs. The improved seal assembly uses both a lead filler and a mechanical support to hold the fibers in place. A 30X handheld viewer was designed for convenient direct viewing of the seal fingerprints. (Modified author abstract) GRA

N75-12043 Societe Nationale Industrielle Aerospatiale, Paris (France). Div. des Systemes Balistiques et Spatiaux.
MEASUREMENT OF AXIAL AND RADIAL STIFFNESS [MESURES DES RIGIDITES AXIALES ET RADIALES]
In its Design and Develop. of a Momentum Wheel with a Mainly Passive Magnetic Bearing, Phase 1, Vol. 2 31 May 1974 22 p In FRENCH (For availability see N75-12041 03-18)

N75-12045 Societe Nationale Industrielle Aerospatiale, Paris (France). Div. des Systemes Balistiques et Spatiaux.
STUDY OF REPULSION BEARINGS
In its Design and Develop. of a Momentum Wheel with a Mainly Passive Magnetic Bearing, Phase 1, Vol. 2 31 May 1974 4 p (For availability see N75-12041 03-18)

N75-12046 Societe Nationale Industrielle Aerospatiale, Paris (France). Div. des Systemes Balistiques et Spatiaux.
CALCULATIONS ON AN ELEMENTARY FLUID DAMPER
In its Design and Develop. of a Momentum Wheel with a Mainly Passive Magnetic Bearing, Phase 1, Vol. 2 31 May 1974 6 p (For availability see N75-12041 03-18)

N75-12048 Societe Nationale Industrielle Aerospatiale, Paris (France). Div. des Systemes Balistiques et Spatiaux.
THEORETICAL STUDY OF SYSTEM DYNAMICS
In its Design and Develop. of a Momentum Wheel with a Mainly Passive Magnetic Bearing, Phase 1, Vol. 2 31 May 1974 79 p (For availability see N75-12041 03-18)

N75-12050 Societe Nationale Industrielle Aerospatiale, Paris (France). Div. des Systemes Balistiques et Spatiaux.
PRINCIPLE OF SYSTEMS WITH FOUCAULT CURRENT DISSIPATION [PRINCIPE DES SYSTEMES A DISSIPATION PAR COURANTS DE FOUCAULT]
In its Design and Develop. of a Momentum Wheel with a Mainly Passive Magnetic Bearing, Phase 1, Vol. 2 31 May 1974 6 p In FRENCH (For availability see N75-12041 03-18)

N75-12051 Societe Nationale Industrielle Aerospatiale, Paris (France). Div. des Systemes Balistiques et Spatiaux.
TEST APPARATUS FOR MOTOR AND MAGNETIC BEARING
In its Design and Develop. of a Momentum Wheel with a Mainly Passive Magnetic Bearing, Phase 1, Vol. 2 31 May 1974 22 p (For availability see N75-12041 03-18)

N75-12053 Societe Nationale Industrielle Aerospatiale, Paris (France). Div. des Systemes Balistiques et Spatiaux.
STUDY OF THE AXIAL ACTUATOR
In its Design and Develop. of a Momentum Wheel with a Mainly Passive Magnetic Bearing, Phase 1, Vol. 2 31 May 1974 16 p (For availability see N75-12041 03-18)

N75-12756* Harvard Coll. Observatory, Cambridge, Mass. Center for Astrophysics.
STABILIZATION, POINTING AND COMMAND CONTROL OF A BALLOON-BORNE 1-METER TELESCOPE
N. L. Hazen, L. M. Coyle, and S. M. Diamond *In* NASA. Ames Res. Center Telescope Systems for Balloon-Borne Res. Nov. 1974 p 202-224 refs Prepared in cooperation with Smithsonian Astrophysical Obs., Cambridge, Mass. and Arizona Univ., Tucson. (For availability see N75-12735 03-74)
(Grant NGR-22-007-270)
CSCL 14B

N75-12758* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
THE AIROSCOPE POINTING AND STABILIZATION SYSTEM
James P. Murphy and Kenneth R. Lorell *In its* Telescope Systems for Balloon-Borne Res. Nov. 1974 p 239-267 refs (For availability see N75-12735 03-74)
CSCL 20F

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N75-12343*# National Aeronautics and Space Administration, Washington, D.C.
MEASUREMENT, TESTING, AND SAFETY TECHNOLOGY: A COMPILATION Technology Utilization
[1974] 28 p
(NASA-SP-5976(01)) Avail: NTIS HC $1.00 CSCL 14D

Methods and techniques in the related areas of measurement, testing, and safety are presented. Measuring techniques and devices and testing methods and devices are described. Articles on equipment modifications or procedures are included. Patent information is presented. Author

N75-12344# Forsvarets Teletekniska Lab., Stockholm (Sweden).
A COMPUTERIZED SYSTEM FOR RELIABILITY PREDICTIONS: RRP-1. PART 1: INTRODUCTION
H. Broberg, I. Hansson, L. Joensson, and I. Persson Sep. 1972 38 p refs
(FTL-A-A16:23-Pt-1) Avail: NTIS HC $3.75

The development of computer techniques for conducting a reliability prediction program is discussed. The system structure has been made flexible through the use of interchangeable component models. Reliability related research findings can be made available by exchanging component models. The program is able to pick out relevant reliability information for each individual

component in its actual functional location. The programs are mainly in FORTRAN for use with the IBM 360/75 computer. Author

N75-12345*# Massachusetts Inst. of Tech., Cambridge. Charles Stark Draper Lab.
RELIABILITY HISTORY OF THE APOLLO GUIDANCE COMPUTER
Eldon C. Hall Jan. 1972 47 p
(Contract NAS9-4065)
(NASA-CR-140340; R-713) Avail: NTIS HC $3.75 CSCL 14D

The Apollo guidance computer was designed to provide the computation necessary for guidance, navigation and control of the command module and the lunar landing module of the Apollo spacecraft. The computer was designed using the technology of the early 1960's and the production was completed by 1969. During the development, production, and operational phase of the program, the computer has accumulated a very interesting history which is valuable for evaluating the technology, production methods, system integration, and the reliability of the hardware. The operational experience in the Apollo guidance systems includes 17 computers which flew missions and another 26 flight type computers which are still in various phases of prelaunch activity including storage, system checkout, prelaunch spacecraft checkout, etc. These computers were manufactured and maintained under very strict quality control procedures with requirements for reporting and analyzing all indications of failure. Probably no other computer or electronic equipment with equivalent complexity has been as well documented and monitored. Since it has demonstrated a unique reliability history, it is important to evaluate the techniques and methods which have contributed to the high reliability of this computer. Author

N75-12346# Commissariat a l'Energie Atomique, Montrouge (France).
APPLICATION OF THE LEAST SQUARE METHOD TO MAGNETIC RESONANCE TECHNIQUES
E. Anger Apr. 1974 103 p In FRENCH
(CEA-R-4511) Avail: AEC Depository Libraries HC $8.25

Computer programs used to analyze resonance and electromagnetic wave absorption are reported. The analysis was made using the least squares method. The resonance curves and signals observed are included. Transl. by E.H.W.

N75-12347# California Univ., Los Angeles. Dept. of Computer Science.
MULTILEVEL MODEL FOR THE SYNTHESIS OF RELIABLE PROGRAMS
C. Lucena and G. Estrin 1974 17 p refs Presented at the SIGPLAN-IEEE-CS Workshop on Fault Tolerant Computing, Toronto, 17 Jun. 1974 Submitted for publication
(Contract AT(04-3)-34)
(UCLA-10-P-14-126; Conf-740649-1) Avail: NTIS HC $3.25

An analysis of the aspects of program design which affect program testing and program debugging was conducted. The investigation showed the need for at least three levels of language: (1) natural language, (2) specification language, and (3) implementation language. The characteristics of the various languages are examined. The framework of the approach is analyzed for effectiveness with respect to the particular goals of more effective testing and debugging. A methodology for synthesis of programs with particular attention to enhancing testability is developed. Author

N75-12348# Bendix Corp., Kansas City, Mo.
AUTOMATED TESTING IN A HIGH NOISE ENVIRONMENT
R. D. Taylor [1974] 15 p refs Presented at Spring DECUS Symp., Boston, 29 May 1974 Sponsored by AEC
(BDX-613-1138; Conf-740533-2) Avail: NTIS HC $3.25

An automatic system for testing functional parameters of high energy electronic component assemblies is described. The assemblies use a low voltage input which is converted to a high voltage of less than 10,000 volts. This energy is stored on a capacitor until a discharge command is received. The test system provides a means of insuring that the unit input power requirements and the high voltage rise rate on the storage capacitor are within specification limits. In addition to the input power requirements, the test system also provides the trigger to start the transfer of energy to the load and digitally monitor the energy content of the output pulse. Author

N75-12349# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
PRINCIPLES OF THE RELIABILITY THEORY OF MECHANICAL SYSTEMS, CHAPTER 8
V. V. Bolotin 22 Aug. 1974 31 p refs Transl. into ENGLISH from Prochnost Ustoichivost-Kolebaniya (USSR), v. 1, 1968 p 164-182
(AD-785209; FTD-MT-24-1005-74) Avail: NTIS CSCL 14/4

An analysis of the principles of reliability engineering is presented. The relationships between reliability, probability of failure, frequency of failures, and intensity of failures are defined mathematically and graphically. Formulas for calculating the reliability of systems from assigned reliabilities of elements are developed. The specific application of reliability theory to strength problems is described. Additional formulas are developed for: (1) determining characteristics of random processes and (2) calculating average durability under cyclic stress with random amplitudes. Author

N75-12350# Applied Science Associates, Inc., Denver, Colo.
COMPUTER GENERATED TROUBLESHOOTING TREES: THE PROGRAM Final Report
William J. Pieper and Allen L. Pinkus Jul. 1974 92 p
(Contract F33615-72-C-1682)
(AD-785139; AFHRL-TR-74-20(2)) Avail: NTIS CSCL 14/4

This report describes the development, use, and tryout of a computer program to prepare troubleshooting trees by computer. The program inputs information on the system data flow, component reliabilities, and costs of available tests. An iterative process is then used to select the most efficient sequence of tests to isolate all possible faults. This is accomplished by computing an index of information gained per unit cost (IGUC) for each test. The test with the highest IGUC is selected as the first test in the tree. The IGUCs are then recomputed for the remaining tests and the test with the highest IGUC is added as the next step in the tree. The process is continued until a tree is developed which will isolate all faults in the system. (Modified author abstract) GRA

N75-12351# Army Material Command, Texarkana, Tex. Intern Training Center.
SAMPLE SIZE DETERMINATION FOR ESTIMATING PARAMETERS OF THE EXPONENTIAL DISTRIBUTION Final Report
John Lewis Andress Mar. 1974 106 p refs
(AD-785503; USAMC-ITC-02-08-73-101) Avail: NTIS CSCL 14/4

This paper shows the development of a method for the estimation of the parameters of the exponential and rectangular distributions. An unsuccessful attempt is made to show that all but random error is eliminated by the use of an F test statistic. The assumption is made the failure-times are from life testing without replacement. The estimators are developed by regression and fitting of the failure data to a theoretical cumulative distribution. Computer simulations are employed to calculate the estimator and the test statistic. Author (GRA)

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance*.

N75-12352+ Engineering Sciences Data Unit, London (England).
BUCKLING STRESS COEFFICIENTS FOR THIN-WALLED UNSTIFFENED CIRCULAR CYLINDERS UNDER COMBINED AXIAL COMPRESSION AND INTERNAL PRESSURE
Jul. 1974 3 p refs
(ESDU-04.01.01-Amend-A) Copyright. Avail: NTIS HC $7.50

Curves are developed to analyze the buckling stress coefficients for thin walled, unstiffened circular cylinders. The loads are combined axial compression and internal pressure. The effects of initial irregularities with different shapes and locations on buckling coefficients are analyzed. The tests on which the curves are based covered a wide range of materials and cylinder sizes.
Author

N75-12353*# Lehigh Univ., Bethlehem, Pa. Dept. of Mechanical Engineering and Mechanics.
ALTERNATING METHOD APPLIED TO EDGE AND SURFACE CRACK PROBLEMS
R. J. Hartranft and G. C. Sih Apr. 1972 111 p refs
(Grant NGR-39-007-066)
(NASA-CR-140846; TR-1; NASA-TR-72-1; IFSM-72-13) Avail: NTIS HC $5.25 CSCL 20K

An alternating method for solving edge crack problems in two dimensions and surface crack problems in three dimensions is presented. The mechanics of the alternating method are defined. A numerical example of the alternating method, based on a simple problem with no singularities is provided. Specific application of the alternating method to the following situations is analyzed: (1) infinite plate with a central crack, (2) edge loaded semi-infinite plate, (3) penny-shaped crack in an infinite body, and (4) semi-elliptical cracks.
Author

N75-12354*# South Dakota State Univ., Brookings. Dept. of Mechanical Engineering.
SLOW AND FAST MOTION OF CRACKS IN INELASTIC SOLIDS. PART 1: SLOW GROWTH OF CRACKS IN A RATE SENSITIVE TRESCA SOLID. PART 2: DYNAMIC CRACK REPRESENTED BY THE DUGDALE MODEL Annual Progress Report
Michael P. Wnuk and George C. Sih (Lehigh Univ.) Aug. 1972 70 p refs
(Grant NGR-42-003-006)
(NASA-CR-140803) Avail: NTIS HC $4.25 CSCL 20K

An extension is proposed of the classical theory of fracture to viscoelastic and elastic-plastic materials in which the plasticity effects are confined to a narrow band encompassing the crack front. It is suggested that the Griffith-Irwin criterion of fracture, which requires that the energy release rate computed for a given boundary value problem equals the critical threshold, ought to be replaced by a differential equation governing the slow growth of a crack prior to the onset of rapid propagation. A new term which enters the equation of motion in the dissipative media is proportional to the energy lost within the end sections of the crack, and thus reflects the extent of inelastic behavior of a solid. A concept of apparent surface energy is introduced to account for the geometry dependent and the rate dependent phenomena which influence toughness of an inelastic solid. Three hypotheses regarding the condition for fracture in the subcritical range of load are compared. These are: (1) constant fracture energy (Cherepanov), (2) constant opening displacement at instability (Morozov) and (3) final stretch criterion (Wnuk).
Author

N75-12355# McGill Univ., Montreal (Quebec).
THE EFFECT OF MATERIAL DAMPING ON THE DYNAMICS OF A VERTICAL TUBULAR CANTILEVER CONVEYING FLUID
Paul E. DesTroisMaisons [1974] 76 p refs
(MERL-TN-74-1) Avail: NTIS HC $4.75

The equation of motion of the vertical cantilever tube with axial fluid flow is developed to account for two types of material damping. The types of damping are: (1) an empirical hysteretic model and (2) a two parameter visco-elastic model. It is shown that the visco-elastic model preserved the symmetry of the root locus diagram about the imaginary axis. The hysteretic model is approximately symmetrical, except when the real part of the frequency becomes close to zero, when the model breaks down. It also gives a more reasonable damping for the second and third modes at zero flow velocity than the visco-elastic model.
Author

N75-12356# Technische Universitaet, Hanover (West Germany).
LINEAR STABILIZATION THEORY FOR CURVED RODS Ph.D. Thesis [LINEARE STABILITAETSTHEORIE GEKRUEMMTER STAEBE]
Friedrich W. Koeper 15 Feb. 1972 120 p refs In GERMAN
Avail: NTIS HC $5.25

The mathematical treatment of the stability equations for curved rods uses transformation matrices between fixed coodinate systems to determine the relationship between initial-, ground-, and adjacent-states. The curved rods are discribed by a convective coordination system, and the Green function is used to calculate the deformation tensor acting on equilibrium stability.
Transl. by G.G.

N75-12357# Advisory Group for Aerospace Research and Development, Paris (France).
STRUCTURAL OPTIMIZATION
Sep. 1974 94 p refs Lecture series presented at Hampton, Va., 10-11 Oct. 1974, Duesseldorf, 14-15 Oct. 1974, and London, 17-18 Oct. 1974
(AGARD-LS-70) Avail: NTIS HC $4.75

A series of reports are presented to inform structural design engineers on the latest developments in partical design optimization methods. Emphasis is placed on the applications and use of these methods in practical design organizations. The subjects considered include the following: (1) use of optimality criteria methods for large scale systems, (2) approximation concepts for structural synthesis, (3) geometric programming methods for structural optimization, and (4) sizing of complex structure by the integration of several different optimal design algorithms. For individual titles, see N75-12358 through N75-12362.

N75-12358 Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio.
USE OF OPTIMALITY CRITERIA METHODS FOR LARGE SCALE SYSTEMS
L. Berke and N. S. Khot *In* AGARD Structural Optimization Sep. 1974 29 p refs (For availability see N75-12357 03-39)

The development of finite element techniques enabled the structural engineer to analyze to analyze the extremely complex structural systems typical of modern aerospace vehicles. The trend now is towards automated design methods. In the case of large structural systems, optimality criteria methods, now in an advanced stage of development, appear to be the most practical for the problem of automated sizing. A brief historical review of optimality criteria methods is given. The general optimality criteria of equal cost of improvement for every active design variable is derived. The problem of multiple active constraints is discussed and solution alternatives are pointed out. As special cases, optimality criteria for generalized deflection constraints, general instability and dynamic response are derived and examples given.
Author

N75-12359* California Univ., Los Angeles.
SOME APPROXIMATION CONCEPTS FOR STRUCTURAL SYNTHESIS
L. A. Schmit, Jr. and B. Farshi *In* AGARD Structural Optimization Sep. 1974 8 p refs Repr. from AIAA J., v. 12, no. 5, May 1974 p 692-699 Presented at the AIAA/ASME/SAE 14th Struct., Structural Dyn., and Mater. Conf., Williamsburg, Va., 20-22 Mar. 1973 (For availability see N75-12357 03-39)
(Grant NGR-05-007-337)
(NASA-CR-140937; Paper-73-341) CSCL 13M

An efficient automated minimum weight design procedure is presented which is applicable to sizing structural systems that can be idealized by truss, shear panel, and constant strain triangles. Static stress and displacement constraints under alternative loading conditions are considered. The optimization algorithm is an adaptation of the method of inscribed hyperspheres and high efficiency is achieved by using several approximation concepts including temporary deletion of noncritical constraints, design variable linking, and Taylor series expansions for response variables in terms of design variables. Optimum designs for several planar and space truss examples problems are presented. The results reported support the contention that the innovative use of approximation concepts in structural synthesis can produce significant improvements in efficiency.
Author

N75-12360 Liverpool Univ. (England).
THE USE OF GEOMETRIC PROGRAMMING METHODS FOR STRUCTURAL OPTIMIZATION

Andrew B. Templeman *In* AGARD Structural Optimization Sep. 1974 17 p refs (For availability see N75-12357 03-39)

Structural design problems may be classified into two types; (1) the detailed design of components and (2) the design of assemblages of idealised components. The paper demonstrates that geometric programming is suitable for a wide range of optimum design problems in both these classes. The mathematics of the geometric programming method is explained with the aid of a simple example and a computer program for large problems is described. It is shown that component design characteristically gives rise to the type of functions best suited to geometric programming. Examples are presented of the use of geometric programming for the optimum design of several kinds of structural components. The design of an integrally stiffened compression panel is examined in more detail. The paper demonstrates that geometric programming can also be used for the optimum design of complete idealised assemblages of components. Examples are given of the minimum weight design of trusses. Author

N75-12361* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

SIZING OF COMPLEX STRUCTURE BY THE INTEGRATION OF SEVERAL DIFFERENT OPTIMAL DESIGN ALGORITHMS

Jaroslaw Sobieszczanski *In* AGARD Structural Optimization Sep. 1974 19 p refs (For availability see N75-12357 03-39) (L-9738)

Practical design of large-scale structures can be accomplished with the aid of the digital computer by bringing together in one computer program algorithms of nonlinear mathematical programing and optimality criteria with weight-strength and other so-called engineering methods. Applications of this approach to aviation structures are discussed with a detailed description of how the total problem of structural sizing can be broken down into subproblems for best utilization of each algorithm and for efficient organization of the program into iterative loops. Typical results are examined for a number of examples. Author

N75-12362 Bell Aerosystems Co., Buffalo, N.Y. Structural Systems Dept.

A DISCRETIZED PROGRAM FOR THE OPTIMAL DESIGN OF COMPLEX STRUCTURES

James R. Batt and Ronald A. Gellatly *In* AGARD Structural Optimization Sep. 1974 15 p refs (For availability see N75-12357 03-39)

More economical and more flexible procedures for structural optimization of large scale systems have been sought. A new approach to determine the minimum weight of such systems has been developed, is discrete in nature, and is labeled the sieve-search technique. An essential element of the technique is the use of data banks which contain minimum weight and associated geometry of structural components. These banks are generated using classical methods of optimization. An additional facet of the technique is the use of simplified engineering analysis methods during the redesign phase of the optimization cycle. Herein lies the efficiency of the sieve-search technique. The method was successfully applied to the design of an extensive class of surface effect vehicles and is shown through application to the design of thermal protective systems and associated wing substructure. Author

N75-12363# Communications Research Centre, Ottawa (Ontario).

THIN-WALLED BEAM THEORY GENERALIZED TO INCLUDE THERMAL EFFECTS AND ARBITRARY TWIST ANGLE

F. Vigneron Oct. 1974 34 p refs

(CRC-1253) Avail: NTIS HC $3.75

Expressions for kinetic energy and elastic, thermal, and external axial load potentials are formulated for an initially straight thin-walled elastic beam. The potentials are applicable for deformations of arbitrary twist angle, small boom axes deflection, and, small rate of change in twist angle. The formulation is based on concepts from this shell theory, appropriately specialized and extended, and utilizes the well-established simplifying assumptions of thin-walled beam theory. Included in the final form of the strain energy potential is a term which accounts for bending of the thin wall, a mechanism apparently neglected by previous investigators. The potentials are given first in terms of variables referenced to axes fixed with respect to the undeformed state and second, in terms of variables referred to axes which rotate with the beam as it deforms. Motion equations are derived for a single beam column. Comparisons with previous results show that the formulation, when specialized for small twist angles, is in accord with established results for cases in which thermal effects are absent. Author

N75-12364*# Cornell Univ., Ithaca, N.Y.

SHEAR BUCKLING OF SQUARE PERFORATED PLATES

John F. Grosskurth, Jr., Richard N. White, Richard H. Gallagher, and Gareth R. Thomas [1974] 47 p refs

(Grant NGL-33-010-070)

(NASA-CR-132548) Avail: NTIS HC $3.75 CSCL 20K

The behavior of thin square perforated plates under the action of uniform shear deformation is studied experimentally and analytically using finite element analysis. Elastic Shear buckling strength is established as a function of the diameter of a round, centrally located hole in the plate. Post buckling behavior and the behavior of perforated plates with various ring stiffeners are also studied experimentally. Author

N75-12365# Royal Aircraft Establishment, Farnborough (England).

INVESTIGATIONS INTO THE CREEP AND AGEING BEHAVIOUR OF GLUED METAL JOINTS

F. Eichhorn, O. Hahn, and K. Fuchs Sep. 1974 15 p refs Transl. into ENGLISH from Adhaesion (West Berlin), v. 17, no. 12, 1973 p 417-421

(RAE-Lib-Trans-1793; BR43698) Avail: NTIS HC $3.25

For a prescribed minimum strength, the length of time during which the glue can be expected to fulfill its function has to be determined experimentally, and allowance must be made for the effect that the type of loading has on changing the characteristics. The changes due to aging were determined for various combinations of glues and materials to be joined and for various joint geometries, both unloaded and loaded. It turns out that increasing the overlap improves not only the load capacity of the joint, but also its aging behaviour. Author

N75-12366# Oak Ridge National Lab., Tenn.

STRESS ANALYSIS OF A RADIAL NOZZLE ATTACHED TO A CYLINDRICAL SHELL UNDER INTERNAL PRESSURE

A. J. Edmondson May 1974 64 p refs

(Contract W-7405-eng-26)

(ORNL-TM-4269) Avail: NTIS HC $4.25

An analytical method for the determination of stresses in the region of intersection of a thin-walled composite shell made from two right circular cylinders intersecting with axes perpendicular and subjected to internal pressure is presented. The governing equations are based on shallow, thin-shell theory and are limited to a ratio of cylinder radii of one-third or less. The formulations are written in terms of dimensionless groups to facilitate use of the analysis method in conducting parameter studies. Comparisons are made between the results obtained using the method and experimental data. The results of the investigation indicate that the analysis should prove to be a useful tool for conducting parametric studies within the specified range of validity. Author (NSA)

N75-12367# Sandia Labs., Livermore, Calif.

CALCULATION OF INCIPIENT FRACTURE AT A SHRINK-FIT PIN INTERFERENCE

A. F. Emery and F. J. Cupps May 1974 29 p refs

(Contract AT(29-1)-789)

(SLL-73-63) Avail: NTIS HC $3.75

The characteristics of a hollow steel pin which is shrunk fit into a matrix and the hoop and radial stresses which exist in the matrix at ambient temperature are discussed. There is a possibility that slowly growing corrosion cracks will form as a result of these stresses and extend to such a size that upon subsequent mechanical loading of the part, rapid mechanical cracking will begin and fracture the part. The obvious locations for incipient corrosion crack growth are identified. Mathematical models of the stress corrosion process are developed. It is stated that the only crack of practical significance is the radial crack for which the stress intensity factors are shown. Two important mitigating factors are plastic deformation and fractional

resistance to movement of the matrix relative to the pin.
Author

N75-12368# Central Electricity Generating Board, Berkeley (England). Nuclear Labs.
FATIGUE CRACK PROPAGATION DUE TO RANDOM AMPLITUDE VIBRATIONS: PREDICTION USING CONSTANT AMPLITUDE DATA
E. K. Priddle Nov. 1973 13 p refs
(RD/B/N-2784) Avail: AEC Depository Libraries HC $4.00

The fatigue crack propagation characteristics of EN3A mild steel under random loadings have been calculated using program RAFCP. The program required a knowledge of the constant amplitude propagation law relating to the material. The stress intensity threshold for propagation Delta Ko at different mean stress intensity values is also required. The computer calculations of endurance of a cracked test piece and the rate of crack propagation are shown to agree with experimental observations. The method may be used for engineering critical assessments of cracked plant or long term reactor design calculations.
Author (NSA)

N75-12369# Oak Ridge National Lab., Tenn.
PROPERTIES OF THICK TYPE 308 STAINLESS STEEL WELDS WITH CONTROLLED RESIDUAL ELEMENTS
R. T. King, J. O. Stiegler, and G. M. Goodwin Jun. 1974 23 p refs
(Contract W-7504-eng-26)
(ORNL-TM-4206) Avail: NTIS HC $3.25

The tensile and creep properties of Type 308 stainless steel shielded metal-arc welds with controlled B, P, and Ti contents have been investigated up to 1100 F. The creep ductility of these welds was generally greater than that previously reported for conventional Type 308 weld metal, while strength properties were comparable or greater than those of conventional weld metal. Systematic microstructural and mechanical property variations were found through the thickness of the welds, which may be related to each other by existing theories. Related property and microstructural variations also occurred in the base metal near the weld. Anisotropic deformation occurred in the weld metal.
Author (NSA)

N75-12370# Sandia Labs., Albuquerque, N.Mex.
FABRICATION OF A CONICAL COMPOSITE STIFFENING RIB
M. Moss, W. L. Cyrus, and W. R. Hoover Jun. 1974 15 p refs
(Contract AT(29-1)-789)
(SLA-74-277) Avail: NTIS HC $3.25

A procedure is described for the fabrication of a Borsic fiber-Al-10 w/o Mg matrix conical composite ring designed to stiffen the substructure of the forward portion of a reentry vehicle. Liquid phase sintering of the alloy matrix during fabrication facilitates densification, and differential thermal expansion of the dies obviates application of external force.
Author (NSA)

N75-12371# Argonne National Lab., Ill.
THERMAL RATCHETING OF A BEAM
T. M. Mulcahy May 1974 31 p refs Sponsored by AEC
(ANL-CT-74-16) Avail: NTIS HC $3.75

Thermal ratchesting has been analytically investigated for a beam subjected to a linear temperature variation across its solid rectangular cross section. A linear strain-hardening material response exhibiting an idealized Bauschinger effect was assumed. Formulas are given for the associated strain accumulation which are valid over a large range of strain hardening, temperature variation, temperature cycles, and axial load. Specific results are tabulated for the materials and operating conditions typically associated with liquid metal breeder reactors.
Author (NSA)

N75-12372# Technische Universitaet, Brunswick (West Germany). Inst. fuer Statik.
SEMINAR ON LOAD CALCULATIONS [SEMINAR TRAG-
presentations were given: maximum load capacity of cross-sections; determination of plastic load limit; determination of deformations; establishing load capacities in stable cases and in cases with large longitudinal forces; the application of load calculations in steel-concrete construction; and load theory of plates. Examples are discussed in detail.
ESRO

N75-12373# Naval Postgraduate School, Monterey, Calif.
THE CHARACTERIZATION OF THE REVERSION STRESS FOR NiTi Ph.D. Thesis
Charliss Robert Such Jun. 1974 55 p refs
(AD-784761) Avail: NTIS CSCL 11/6

The reversion stress of NiTi is characterized under several unique thermomechanical situations. The effect of partial reversion of initial strain on the reversion stress is studied. The final stress is apparently not dependent on whether the initial strain is lost by stress-free reversion or stress-reversion. The effect of developed stress on the temperature range for the reversion transformation to austenite is also studied. A model for the mechanism of constant-stress reversion is proposed. (Modified author abstract)
GRA

N75-12374# Lehigh Univ., Bethlehem, Pa. Inst. of Fracture and Solid Mechanics.
LOAD AND ENVIRONMENT INTERACTIONS IN FATIGUE CRACK GROWTH
T. T. Shih and R. P. Wei May 1974 28 p refs Presented at the Conf. on the Prospects of Advan. Fracture Mech., Delft, Netherlands, 24-28 Jun. 1974
(Contract N00014-67-A-0370-0008; NR Proj. 036-097)
(AD-785249; IFSM-74-61; TR-2) Avail: NTIS CSCL 11/6

The influences of environment on delay and on fatigue crack growth under programmed loading were examined for a mill annealed Ti-6Al-4V alloy. Test environments included dehumidified argon, air (with 30-60% relative humidity), distilled water, and 3.5% NaCl solution. The effects of load sequence and block size on fatigue under programmed loads were investigated also. Experimental results show that the mildly aggressive environments (atmospheric moisture and distilled water) have little effect on delay. Salt solution, on the other hand, has a significant effect on delay and on crack growth under programmed loading; the effect on delay being dependent on frequency or hold-time. Both load sequence and block size can significantly alter fatigue life under programmed loading. The need for further fundamental understanding of load and environment interactions in fatigue is discussed. (Modified author abstract)
GRA

N75-12375# Delaware Univ., Newark. Dept. of Mechanical and Aerospace Engineering.
ANALYSIS AND DESIGN OF COMPOSITE BONDED JOINTS UNDER A DYNAMIC TYPE LOAD Final Report, Nov. 1968 - May 1974
Jack R. Vinson Aug. 1974 29 p refs
(Grant AF-AFOSR-1760-69; AF Proj. 9782)
(AD-785433; AFOSR-74-1379TR) Avail: NTIS CSCL 13/5

Contributions were made to further the use of composite materials and their use in structures. These areas include the response of spherical and cylindrical shells to localized loads, the elastic stability of plates to in-plane loads, determination of accurate values of interlaminar shear and normal stresses in laminated shell construction, and the design and optimization of bonded joints in composite material constructions. (Modified author abstract)
GRA

N75-12376# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
STRUCTURAL MECHANICS OF SKEWED THIN WALL SYSTEMS
I. P. Braztsov and G. G. Onanov 19 Jul. 1974 813 p refs Transl. into ENGLISH of the book "Stroitelnaya Mekhanika Skoshennykh Tonkostennykh Sistem' USSR, 1973 p 1-659
(AD-785116; FTD-HC-23-1297-74) Avail: NTIS CSCL 20/11

The general subject of the report is a reinforced conical

swept, low-aspect, delta, etc.) and different types of airframes. The Lagrange variational principle is used to develop a general method of calculation of a reinforced conical shell of arbitrary configuration, amounting to the integration of a system of ordinary differential equations describing the operation of oblique thin-walled systems when the form of external actions is arbitrary. GRA

N75-12377# Grumman Aerospace Corp., Bethpage, N.Y. Research Dept.
A THREE DIMENSIONAL VARIABLE NODE ISOPARAMETRIC SOLID ELEMENT
Alvin Levy Jul. 1974 24 p refs
(AD-785353; RE-587) Avail: NTIS CSCL 20/11

Methods for the linear stress analysis of complex three dimensional bodies have been limited, until very recently, to a few cases involving special geometric and loading situations; corresponding analyses for nonlinear material behavior have been virtually nonexistent. Now, however, with the aid of three dimensional isoparametric solid elements, many of the difficulties inherent in analyzing three dimensional nonlinear material behavior were overcome. In this memorandum the author presents investigations of a mixed isoparametric hexahedron containing a variable number of nodes (between 8 and 20). A derivation is presented for the element stiffness matrix consistent mass matrix, initial strain matrix, and consistent load vector allowing for orthotropic material behavior. (Modified author abstract) GRA

N75-12378# Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio.
DISPERSION-STRENGTHENED METAL FIN STRUCTURAL TEST
Murray N. England May 1974 42 p
(Contract F33615-67-C-1319)
(AD-785374; AFFDL-TR-74-36) Avail: NTIS CSCL 22/2

A full scale fin constructed of Dispersion-Strengthened Metal (DSM) material (Ni-20Cr-2ThO2) representative of the fin on the FDL-5A re-entry vehicle was subjected to fifty simulated missions of earth orbital ascents and re-entry. The fin structure had a projected area of 15.7 square feet and was loaded and heated to a maximum temperature of 2200F during the re-entry simulation. This report describes the test setup, procedures and equipment used during the simulation. The fin successfully completed the fifty missions, suffering only local failures which were repaired. Author (GRA)

N75-12379# Stanford Univ., Calif. Dept. of Applied Mechanics.
WEAKENING OF AN ELASTIC SOLID BY A RECTANGULAR ARRAY OF CRACKS Interim Report
W. R. Delameter, G. Herrmann, and D. M. Barnett Jul. 1974 36 p refs
(Contract N00014-68-A-0112-0065; Grant AF-AFOSR-1905-70; AF Proj. 9782)
(AD-785436; SUDAM-74-5; AFOSR-74-1447TR) Avail: NTIS CSCL 20/12

An infinite elastic solid containing a doubly-periodic rectangular array of slit-like cracks is considered. The solid is subjected to a uniform stress resulting in a state of plane strain. The cracks are represented as suitable distributions of dislocations which are determined from a singular integral equation. This equation is solved numerically in an efficient manner using an expansion of the nonsingular part of the kernel in a series of Chebyshev polynomials. Values of the stress intensity factors are presented, as well as the change in strain energy due to the presence of the cracks. Also, the effective elastic constants of a sheet having a rectangular array of cracks are given as functions of the crack spacing. Author (GRA)

N75-12380# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
DYNAMICS OF ELASTIC SHELLS CONTAINING ACOUSTIC MEDIUM WITH SOURCES
A. A. Ilgamov 23 Aug. 1974 43 p refs Transl. into ENGLISH from Akad. Nauk SSSR. Kazan. Fiz-Tekh. Inst. Teor. Plastin i Obolochek (USSR), 1971 p 99-122
(AD-785193; FTD-MT-24-1104-74) Avail: NTIS CSCL 20/11

A general formulation is given for the interaction between thin walled elastic shells and the liquid, or gas which they contain. The formulation is for the interaction in the presence of sources, or drains. An approximate solution is developed, and a variation is introduced for other forms of the problem. Author

N75-12381# Weidlinger Associates, New York.
COMPARISON OF THE RESULTS OF THE DYNAMIC RESPONSE OF CYLINDRICAL SHELLS BY FINITE ELEMENT METHODS: AXISYMMETRIC CASE Final Report
A. T. Matthews and H. H. Bleich 14 Aug. 1974 45 p refs
(Contract DASA01-71-C-0098; DNA Proj. NWEP-ST99QAXS)
(AD-785258; DNA-3312F) Avail: NTIS CSCL 16/1

The response of an infinitely long cylindrical shell buried in a bi-linear (hysteretic) material is obtained for a pressure pulse rho (tau), applied to the inner boundary of the shell. The solution is obtained by means of a characteristic approach. Comparison of this solution with one obtained from a computer program for the same configuration using the finite element method is given. Also given are comparisons for a similar configuration, where the pressure is applied at an outer boundary in the medium. Both sets of comparisons are in very good agreement. Finally, a criterion is given which permits one to judge the order of agreement which is to be expected in other situations, for the case of an incoming wave. Author

N75-12382# University of Southern Calif., Los Angeles. Dept. of Electrical Engineering.
OPTIMUM RESPONSE SIMULATION OF MULTIDEGREE SYSTEMS BY PULSE EXCITATION
S. F. Masri, G. A. Bekey, and F. B. Safford (Agbabian Associates, El Segundo, Calif.) 1974 39 p refs
(Grant AF-AFOSR-2008-71)
(AD-783226; AFOSR-74-1195TR) Avail: NTIS CSCL 13/13

A computer algorithm is presented for the optimum selection of a series of train of force pulses for application to a continuous system. The optimized pulse train generates oscillations in a system to match within specified error bounds the responses which would be produced by a continous loading of arbitrary nature such as earthquake excitation. This computationally efficient algorithm is applied to several examples including a model of a physical system. It is shown that it is feasible to adequately simulate the motion of a complicated system by using appropriate force pulse trains. Author (GRA)

N75-12383# Naval Air Development Center, Warminster, Pa. Administration and Technical Services Dept.
VIBRATION ENERGY DENSITY SPECTRA IN RESPONSE DOMAIN FOR VISCOUS DAMPED ELASTIC SYSTEMS WITH SINUSOIDAL AND BROADBAND RANDOM EXCITATION
J. N. Tait 2 Aug. 1974 76 p
(AD-784974; NADC-73227-81) Avail: NTIS CSCL 20/11

This report presents the development of the response energy density spectra for a rigidly-connected viscous damped elastic structure model, when subjected to all controlled patterns of sinusoidal and broadband random vibration excitation. The results are illustrated by families of computer-programmed plots for the specimen curves. Author (GRA)

42 GEOSCIENCES (GENERAL)

N75-12384# Joint Publications Research Service, Arlington, Va.
SOVIET BLOC RESEARCH IN GEOPHYSICS, ASTRONOMY, AND SPACE, NO. 337
27 Nov. 1974 30 p refs Transl. into ENGLISH from various Russian articles
(JPRS-63543) Avail: NTIS HC $3.75

Abstracts are presented of articles on meteorology, oceanography, upper atmosphere and space research, astronomy and terrestrial geophysics, covering both science news and formal scientific reports. Published details of Soviet space spectaculars are included. Author

N75-12385# Joint Publications Research Service, Arlington, Va.
SOVIET BLOC RESEARCH IN GEOPHYSICS, ASTRONOMY, AND SPACE, NO. 336
12 Nov. 1974 49 p refs Transl. into ENGLISH from various RUSSIAN journals
(JPRS-63427) Avail: NTIS HC $3.75

Abstracts of articles on meteorology, oceanography, upper atmosphere and space research, astronomy and terrestrial geophysics, covering both science news and formal scientific reports. Published details of Soviet space spectaculars are included. Author

N75-12386# Joint Publications Research Service, Arlington, Va.
GEOTECHNOLOGICAL METHODS FOR MINERAL PRODUCTION
V. Arens 19 Nov. 1974 15 p refs Transl. into ENGLISH from Nauka i Zhizn (Moscow), no. 9 1974 p 18-24
(JPRS-63469) Avail: NTIS HC $3.25

A discussion on geotechnological methods for mineral production in the U.S.S.R. is presented, with emphasis on extraction equipment operation and improvements. Author

N75-12387# Royal Inst. of Tech., Stockholm (Sweden).
MATHEMATICAL MODELS FOR SOME PROBLEMS IN WATER CONSERVATION [MATEMATISKA MODELLER FOER NAGRA VATTENVARDSPROBLEM]
Thomas Kaijser 1972 70 p refs In SWEDISH
(PT-1972:7) Avail: NTIS HC $4.25

A number of mathematical models for different processes and occurrences in a water system are reported. The models offer good chances of developing to an analysis of variables and situations of interest to the water engineer. The first chapter reports on models which describe the movement of water particles in a water system, known as distribution models. Starting from the models, calculations are then made as to how impurity concentrations in the water system vary with respect to time and space. Author

N75-12388# Los Alamos Scientific Lab., N.Mex.
EXPERIMENTAL MEASUREMENT OF IN SITU STRESS IN GRANITE BY HYDRAULIC FRACTURING
R. L. Aamodt Apr. 1974 4 p refs
(Contract W-7405-eng-36)
(LA-5605-MS) Avail: NTIS HC $3.25

The technique of hydraulic fracturing of rock to increase the production of oil and gas wells is described. Hydraulic fracturing experiments were carried out in a well drilled into Precambrian granite. The energy required to create and then to reopen one fracture was determined by integrating the pressure-volume curves. This technique has been found suitable for use with rock of low permeability or with nonpenetrating fluids. A numerical analysis of the forces imposed on the rock is provided. The physical nature of the cracks which occurred in the granite is analyzed. Author

N75-12389# Northwestern Univ., Evanston, Ill. Dept. of Geological Sciences.
SPATIAL AND TEMPORAL VARIATIONS IN GEOMETRIC AND MATERIAL PROPERTIES OF A NATURAL BEACH
William C. Krumbein and William R. James Jun. 1974 82 p refs
(Contracts DACW72-70-C-0011; DACW72-71-C-0007; DACW72-72-C-0010; Grant DAGW72-72-C-0002)
(AD-785572; CERC-TM-44) Avail: NTIS CSCL 13/2

Contour maps of beach foreshore properties, such as mean grain size and beach slope, give spatial continuity to beach observations, and repetitive sampling endows the areal patterns with continuity in time. Rapid measurement methods and data reduction by portable computer terminal yield nearly real-time data for analyzing beach phenomena in theoretical and applied geological and coastal engineering studies while the field party is on the site. Maps were made at intervals over a 3-year period on the same stretch of beach located upcoast from Point Mugu, California. These maps included open unimpeded segments and segments immediately upbeach and downbeach of an impermeable steel sheet piling groin built for experimental purposes by CERC. A rectangular foreshore grid, 100 by 125 feet on edge, with rows parallel to the waterline was used as a convenient mapping cell. Aggregate properties of the beach, such as bulk density, shear resistance, water content, and conventional textural and geometric attributes, were mapped from samples collected at the grid points. (Modified author abstract) GRA

N75-12505 Joint Publications Research Service, Arlington, Va.
SIMPLIFIED METHOD OF MEASURING THE LENGTH OF HIGHLY SINUOUS RIVERS
A. P. Kopylov *In its* Meteorology and Hydrol., No. 8, 1974 (JPRS-63560) 29 Nov. 1974 p 156-158 Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 8, 1974 p 115-116 (For availability see N75-12488 03-47)

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography*.

N75-12390*# Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
AN INTERDISCIPLINARY ANALYSIS OF MULTISPECTRAL SATELLITE DATA FOR SELECTED COVER TYPES IN THE COLORADO MOUNTAINS, USING AUTOMATIC DATA PROCESSING TECHNIQUES Monthly Progress Report, Oct. 1974
Roger M. Hoffer, Principal Investigator Oct. 1974 7 p EREP
(Contract NAS9-13380)
(E75-10002; NASA-CR-140688) Avail: NTIS HC $3.25 CSCL 08F

The author has identified the following significant results. Documentation is presented of the capability of the middle infrared portion of the electromagnetic spectrum to spectrally differentiate clouds from snow. Other portions of the spectrum cannot provide this capability.

N75-12391*# Environmental Research Inst. of Michigan, Ann Arbor.
STUDY OF ATMOSPHERIC EFFECTS IN SKYLAB DATA Quarterly Progress Report, 1 Jun. - 31 Aug. 1974
Frederick J. Thomson, Principal Investigator 6 Nov. 1974 3 p EREP
(Contract NAS9-13272)
(E75-10006; NASA-CR-140728; ERIM-101700-17-L; QPR-6) Avail: NTIS HC $3.25 CSCL 05B

There are no author-identified significant results in this report.

N75-12392*# Environmental Research Inst. of Michigan, Ann Arbor. Infrared and Optics Div.
MAPPING EXPOSED SILICATE ROCK TYPES AND EXPOSED FERRIC AND FERROUS COMPOUNDS FROM A SPACE PLATFORM Quarterly Report, 8 Jun. - 8 Sep. 1974
Frederick J. Thomson, Principal Investigator 11 Nov. 1974 3 p EREP
(Contract NAS9-13317)
(E75-10008; NASA-CR-140658; ERIM-102000-27-L) Avail: NTIS HC $3.25 CSCL 08B

There are no author-identified significant results in this report.

N75-12393*# Boeing Co., Kent, Wash.
QUANTITATIVE DETERMINATION OF STRATOSPHERIC AEROSOL CHARACTERISTICS Monthly Report, Oct. 1974
David L. Tingey, Principal Investigator Oct. 1974 1 p EREP
(Contract NAS9-13303)
(E75-10010; NASA-CR-140656) Avail: NTIS HC $3.25 CSCL 04A

There are no author-identified significant results in this report.

N75-12394*# South Dakota State Univ., Brookings. Remote Sensing Inst.

DEVELOP TECHNIQUES AND PROCEDURES, USING MULTISPECTRAL SYSTEMS, TO IDENTIFY FROM REMOTELY SENSED DATA THE PHYSICAL AND THERMAL CHARACTERISTICS OF PLANTS AND SOIL Monthly Progress Report, Sep. 1974
Victor I. Myers, Principal Investigator 20 Oct. 1974 2 p EREP
(Contract NAS9-13337)
(E75-10012; NASA-CR-140654) Avail: NTIS HC $3.25 CSCL 08F

There are no author-identified significant results in this report.

N75-12395*# Iowa Univ., Iowa City. Dept. of Geology.
EXPERIMENT TO EVALUATE FEASIBILITY OF UTILIZING SKYLAB-EREP REMOTE SENSING DATA OF TECTONIC ANALYSIS OF THE BIGHORN MOUNTAINS REGION, WYOMING-MONTANA Quarterly Progress Report, 1 Jul. - 30 Sep. 1974
Richard A. Hoppin, Principal Investigator 20 Oct. 1974 6 p EREP
(Contract NAS9-13313)
(E75-10014; NASA-CR-140650) Avail: NTIS HC $3.25 CSCL 08G

There are no author-identified significant results in this report.

N75-12396*# National Oceanic and Atmospheric Administration, Miami, Fla.
AN ASSESSMENT OF THE POTENTIAL CONTRIBUTIONS TO OCEANOGRAPHY FROM SKYLAB VISUAL OBSERVATIONS AND HAND-HELD PHOTOGRAPHY Monthly Progress Report, Aug. 1974
George A. Maul, Principal Investigator and Michael McCaslin Aug. 1974 18 p EREP
(NASA Order T-4713-B)
(E75-10017; NASA-CR-140731) Avail: NTIS HC $3.25 CSCL 08J

There are no author-identified significant results in this report.

N75-12397*# Cornell Univ., Ithaca, N.Y. Dept. of Natural Resources.
EVALUATION OF SKYLAB IMAGERY AS AN INFORMATION SERVICE FOR INVESTIGATING LAND USE AND NATURAL RESOURCES Progress Report
Ernest E. Hardy, Principal Investigator [1974] 18 p EREP
(Contract NAS9-13364)
(E75-10018; NASA-CR-140732) Avail: NTIS HC $3.25 CSCL 05B

There are no author-identified significant results in this report.

N75-12398*# Geological Survey, Reston, Va.
URBAN AND REGIONAL LAND USE ANALYSIS: CARETS AND CENSUS CITIES EXPERIMENT PACKAGE Monthly Progress Report, Jul. - Aug. 1974
Robert Alexander, Principal Investigator and Harry F. Lins, Jr. 20 Aug. 1974 4 p EREP
(NASA Order T-5290-B)
(E75-10019; NASA-CR-140733) Avail: NTIS HC $3.25 CSCL 08B

The author has identified the following significant results. The most significant finding has been the ability of the S-190B data to produce land use maps not far removed from the quality of high altitude aircraft photography generated maps.

N75-12399*# Environmental Research Inst. of Michigan, Ann Arbor.
STUDY OF RECREATIONAL LAND AND OPEN SPACE USING SKYLAB IMAGERY Monthly Progress Report, Sep. 1974
Irvin J. Sattinger, Principal Investigator 15 Oct. 1974 2 p EREP
(Contract NAS9-13283)
(E75-10020; NASA-CR-140734; ERIM-103300-35-L) Avail: NTIS HC $3.25 CSCL 08B

There are no author-identified significant results in this report.

N75-12400*# National Oceanic and Atmospheric Administration, Washington, D.C.
A CLOUD PHYSICS INVESTIGATION UTILIZING SKYLAB DATA Quarterly Progress Report, Jul. - Sep. 1974
John Alishouse, Herbert Jacobowitz, and David Wark, Principal Investigators Sep. 1974 4 p EREP
(NASA Order T-4715-B)
(E75-10021; NASA-CR-140735; QPR-6) Avail: NTIS HC $3.25 CSCL 04A

There are no author-identified significant results in this report.

N75-12401*# Geological Survey, Bay Saint Louis, Miss.
HYDROLOGIC SIGNIFICANCE OF LINEAMENTS IN CENTRAL TENNESSEE Quarterly Progress Report, 1 Jun. - 31 Aug. 1974
Gerald K. Moore and Este F. Hollyday, Principal Investigators 31 Aug. 1974 6 p EREP
(NASA Order H-2810-B)
(E75-10030; NASA-CR-140741) Avail: NTIS HC $3.25 CSCL 08H

There are no author-identified significant results in this report.

N75-12402*# Pacific Southwest Forest and Range Experiment Station, Berkeley, Calif.
INVENTORY OF FOREST AND RANGELAND RESOURCES, INCLUDING FOREST STRESS Bimonthly Progress Report, 16 Sep. - 15 Nov. 1974
Robert C. Aldrich, Frederick P. Weber, and Richard S. Driscoll, Principal Investigators 18 Nov. 1974 7 p EREP
(NASA Order T-4106-B)
(E75-10032; NASA-CR-140762; BMPR-14) Avail: NTIS HC $3.25 CSCL 02F

There are no author-identified significant results in this report.

N75-12403*# South Dakota State Univ., Brookings. Remote Sensing Inst.
DEVELOP TECHNIQUES AND PROCEDURES, USING MULTISPECTRAL SYSTEMS, TO IDENTIFY FROM REMOTELY SENSED DATA THE PHYSICAL AND THERMAL CHARACTERISTICS OF PLANTS AND SOIL Monthly Progress Report, Oct. 1974
Victor I. Myers, Principal Investigator 20 Nov. 1974 2 p EREP
(Contract NAS9-13337)
(E75-10033; NASA-CR-140763) Avail: NTIS HC $3.25 CSCL 08F

There are no author-identified significant results in this report.

N75-12404*# Environmental Research Inst. of Michigan, Ann Arbor.
STUDY OF RECREATIONAL LAND AND OPEN SPACE USING SKYLAB IMAGERY Monthly Progress Report, Oct. 1974
Irvin J. Sattinger, Principal Investigator 20 Nov. 1974 5 p refs EREP
(Contract NAS9-13283)
(E75-10034; NASA-CR-140771; ERIM-103300-37-L) Avail: NTIS HC $3.25 CSCL 08B

There are no author-identified significant results in this report.

N75-12405*# Kansas Univ. Center for Research, Inc., Lawrence. Atmospheric Science Lab.
DETECTION OF MOISTURE AND MOISTURE RELATED PHENOMENA FROM SKYLAB Monthly Progress Report, Sep. 1974
Joe R. Eagleman, Principal Investigator and Norman Hardy Sep. 1974 7 p EREP
(Contract NAS9-13273)
(E75-10035; NASA-CR-140772; TR-239-17) Avail: NTIS HC $3.25 CSCL 08B

There are no author-identified significant results in this report.

N75-12406*# Environmental Research and Technology, Inc., Lexington, Mass.
EXPERIMENTAL EVALUATION OF ATMOSPHERIC EFFECTS ON RADIOMETRIC MEASUREMENTS USING THE EREP OF SKYLAB Quarterly Progress Report, Aug. - Oct. 1974
David T. Chang, Principal Investigator Oct. 1974 14 p EREP
(Contract NAS9-13343)
(E75-10036; NASA-CR-140773; QPR-6) Avail: NTIS HC $3.25 CSCL 04B
There are no author-identified significant results in this report.

N75-12407*# Wolf Research and Development Corp., Pocomoke City, Md.
APPLICABILITY OF SKYLAB REMOTE SENSING FOR DETECTION AND MONITORING OF SURFACE MINING ACTIVITIES Quarterly Progress Report, 1 Jul. - 30 Sep. 1974
R. L. Brooks, Principal Investigator and J. D. Pennewell Oct. 1974 6 p EREP
(Contract NAS9-13310)
(E75-10038; NASA-CR-140775; QPR-4) Avail: NTIS HC $3.25 CSCL 08I
There are no author-identified significant results in this report.

N75-12408*# Environmental Research Inst. of Michigan, Ann Arbor.
A SKYLAB PROGRAM FOR THE INTERNATIONAL HYDROLOGICAL DECADE (IHD) Quarterly Report, Dec. 1973 - Feb. 1974
Fabian C. Polcyn and Thomas W. Wagner, Principal Investigators 18 Nov. 1974 3 p EREP
(Contract NAS9-13275)
(E75-10039; NASA-CR-140776; ERIM-102300-8-L) Avail: NTIS HC $3.25 CSCL 08H
There are no author-identified significant results in this report.

N75-12409*# Environmental Research Inst. of Michigan, Ann Arbor.
DEVELOPING PROCESSING TECHNIQUES FOR SKYLAB DATA Monthly Progress Report, Oct. 1974
Richard F. Nalepka and William A. Malila, Principal Investigators 14 Nov. 1974 4 p EREP
(Contract NAS9-13280)
(E75-10040; NASA-CR-140777; ERIM-101900-42-L) Avail: NTIS HC $3.25 CSCL 05B
There are no author-identified significant results in this report.

N75-12410*# Colorado School of Mines, Golden. Dept. of Geology.
INDEX OF SKYLAB DATA AVAILABLE AT COLORADO SCHOOL OF MINES
Keenan Lee, Principal Investigator and Gary L. Prost 31 Oct. 1974 32 p Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 EREP
(Contract NAS9-13394)
(E75-10041; NASA-CR-140778; Rept-74-8) Avail: NTIS HC $3.75 CSCL 05B
There are no author-identified significant results in this report.

N75-12411*# Long Island Univ., Greenvale, N.Y. Science Engineering Research Group.
IN SITU SPECTRORADIOMETRIC CALIBRATION OF EREP IMAGERY AND OCEANOGRAPHY OF BLOCK ISLAND SOUND Progress Report, Apr. - Nov. 1974
E. Yost, Principal Investigator 15 Nov. 1974 6 p EREP
(Contract NAS9-13308)
(E75-10042; NASA-CR-140779) Avail: NTIS HC $3.25 CSCL 08J
There are no author-identified significant results in this report.

N75-12412*# Colorado School of Mines, Golden. Dept. of Geology.
GEOLOGIC AND MINERAL AND WATER RESOURCES INVESTIGATIONS IN WESTERN COLORADO, USING SKYLAB EREP DATA Monthly Progress Report, Oct. 1974
Keenan Lee, Principal Investigator 15 Nov. 1974 4 p EREP
(Contract NAS9-13394)
(E75-10043; NASA-CR-140780) Avail: NTIS HC $3.25 CSCL 08G
There are no author-identified significant results in this report.

N75-12413*# Geological Survey, Denver, Colo.
REMOTE SENSING GEOPHYSICS FROM SKYLAB Monthly Report, Jun. 1974
Kenneth Watson, Principal Investigator and H. A. Pohn Jun. 1974 2 p EREP
(NASA Order T-6555-B)
(E75-10045; NASA-CR-140782) Avail: NTIS HC $3.25 CSCL 08G
There are no author-identified significant results in this report.

N75-12414*# Agricultural Research Service, Weslaco, Tex.
IRRIGATION SCHEDULING, FREEZE WARNING AND SOIL SALINITY DETECTING Monthly Progress Report, Oct. 1974
Craig L. Wiegand, Principal Investigator Oct. 1974 3 p EREP
(NASA Order T-4105-B)
(E75-10046; NASA-CR-140783; MPR-10) Avail: NTIS HC $3.25 CSCL 02C
There are no author-identified significant results in this report.

N75-12415*# Bureau of Mineral Resources, Geology and Geophysics, Canberra (Australia). Div. of Mineral Physics.
A STUDY OF THE USEFULNESS OF SKYLAB EREP DATA FOR EARTH RESOURCES STUDIES IN AUSTRALIA Quarterly Progress Report, Aug. - Oct. 1974
K. L. Burns and J. Shepherd, Principal Investigators Oct. 1974 1 p Sponsored by NASA EREP
(E75-10047; NASA-CR-140784) Avail: NTIS HC $3.25 CSCL 05B
There are no author-identified significant results in this report.

N75-12416# Committee on Science and Astronautics (U. S. House).
EARTH RESOURCES SURVEY SYSTEM
Washington GPO 1974 286 p refs Hearings on H.R. 14978 and H.R. 15781 before Subcomm. on Space Sci. and Appl. of Comm. on Sci. and Astronaut., 93d Congr., 2d Sess., No. 46, 3, 4, and 9 Oct. 1974
(GPO-41-665) Avail: Subcomm. on Space Sci. and Appl.
The hearings to explore the desirability of creating an operational satellite system for surveying the earth's resources are reported. The ERTS program is reviewed, and the technology for data acquisition, dissemination, and utilization are assessed along with remote sensing techniques. F.O.S.

N75-12417*# Environmental Research Inst. of Michigan, Ann Arbor. Infrared and Optics Div.
NEW THEORETICAL MODELS AND RATIO IMAGING TECHNIQUES ASSOCIATED WITH THE NASA EARTH RESOURCES SPECTRAL INFORMATION SYSTEM Technical Report, 1 Feb. 1973 - 31 Jan. 1974
R. K. Vincent Jul. 1974 116 p refs
(Contract NAS9-9784)
(NASA-CR-140357; ERIM-190100-30-T) Avail: NTIS HC $5.25 CSCL 05B
Four independent investigations are reported; in general these are concerned with improving and utilizing the correlation between the physical properties of natural materials as evidenced in laboratory spectra and spectral data collected by multispectral scanners. In one investigation, two theoretical models were devised that permit the calculation of spectral emittance spectra for rock and mineral surfaces of various particle sizes. The simpler of the two models can be used to qualitatively predict the effect

of texture on the spectral emittance of rocks and minerals; it is also potentially useful as an aid in predicting the identification of natural atmospheric aerosol constituents. The second investigation determined, via an infrared ratio imaging technique, the best pair of infrared filters for silicate rock-type discrimination. In a third investigation, laboratory spectra of natural materials were compressed into 11-digit ratio codes for use in feature selection, in searches for false alarm candidates, and eventually for use as training sets in completely automatic data processors. In the fourth investigation, general outlines of a ratio preprocessor and an automatic recognition map processor are developed for on-board data processing in the space shuttle era. Author

N75-12418*# ESL, Inc., Sunnyvale, Calif.
EARTH RESOURCES SENSOR DATA HANDLING SYSTEM: NASA JSC VERSION Final Design Report
29 Apr. 1974 23 p
(Contract NAS9-14077)
(NASA-CR-140334; ESL-SR-132) Avail: NTIS HC $3.25 CSCL 05B

The design of the NASA JSC data handling system is presented. Data acquisition parameters and computer display formats and the flow of image data through the system, with recommendations for improving system efficiency are discussed along with modifications to existing data handling procedures which will allow utilization of data duplication techniques and the accurate identification of imagery. N.R.

N75-12419*# Lockheed Electronics Co., Houston, Tex. Aerospace Systems Div.
FEASIBILITY STUDY ASCS REMOTE SENSING/ COMPLIANCE DETERMINATION SYSTEM Final Report
I. E. Duggan, T. C. Minter, Jr., B. H. Moore, and C. T. Nosworthy
Jan. 1973 137 p refs
(Contract NAS9-12200)
(NASA-CR-134288; EO-126) Avail: NTIS HC $5.75 CSCL 05B

A short-term technical study was performed by the MSC Earth Observations Division to determine the feasibility of the proposed Agricultural Stabilization and Conservation Service Automatic Remote Sensing/Compliance Determination System. For the study, the term automatic was interpreted as applying to an automated remote-sensing system that includes data acquisition, processing, and management. Author

N75-12420*# Control Data Corp., Minneapolis, Minn.
CORRELATION AND REGISTRATION OF ERTS MULTISPECTRAL IMAGERY
L. O. Bonrud and P. J. Henrikson Apr. 1974 127 p refs
(Contract NAS9-13114)
(NASA-CR-134294) Avail: NTIS HC $5.25 CSCL 05B

Examples of automatic digital processing demonstrate the feasibility of registering one ERTS multispectral scanner (MSS) image with another obtained on a subsequent orbit, and automatic matching, correlation, and registration of MSS imagery with aerial photography (multisensor correlation) is demonstrated. Excellent correlation was obtained with patch sizes exceeding 16 pixels square. Qualities which lead to effective control point selection are distinctive features, good contrast, and constant feature characteristics. Results of the study indicate that more than 300 degrees of freedom are required to register two standard ERTS-1 MSS frames covering 100 by 100 nautical miles to an accuracy of 0.6 pixel mean radial displacement error. An automatic strip processing technique demonstrates 600 to 1200 degrees of freedom over a quater frame of ERTS imagery. Registration accuracies in the range of 0.3 pixel to 0.5 pixel mean radial error were confirmed by independent error analysis. Accuracies in the range of 0.5 pixel to 1.4 pixel mean radial error were demonstrated by semi-automatic registration over small geographic areas. Author

N75-12421*# Minnesota Univ., Minneapolis. Space Science Center.
A STUDY OF MINNESOTA FORESTS AND LAKES USING DATA FROM EARTH RESOURCES TECHNOLOGY SATELLITES Twenty-four Month Progress Report, Jul. 1974
30 Jun. 1974 246 p refs
(Grant NGL-24-005-263)
(NASA-CR-140865) Avail: NTIS HC $7.50 CSCL 08F

Highlights of research and practical benefits are discussed for the following projects which utilized ERTS 1 data to provide municipal, state, federal, and industrial users with environmental resource information for the state of Minnesota: (1) forest disease detection and control; (2) evaluation of water quality by remote sensing techniques; (3) forest vegetation classification and management; (4) detection of saline soils in the Red River Valley; (5) snowmelt flood prediction; (6) remote sensing applications to hydrology; (7) Rice Creek watershed project; (8) water quality in Lake Superior and the Duluth Superior Harbor; and (9) determination of Lake Superior currents from turbidity patterns. A.A.D.

N75-12422*# Electromagnetic Systems Labs., Sunnyvale, Calif.
IMAGE SELECTION SYSTEM
M. A. Knutson, Donald Hurd, Larry Hubble, and Richard M. Kroeck Washington NASA Nov. 1974 98 p ref
(Contract NAS2-7064)
(NASA-CR-2475; ESL-TM-456) Avail: NTIS HC $4.75 CSCL 05B

An image selection (ISS) was developed for the NASA-Ames Research Center Earth Resources Aircraft Project. The ISS is an interactive, graphics oriented, computer retrieval system for aerial imagery. An analysis of user coverage requests and retrieval strategies is presented, followed by a complete system description. Data base structure, retrieval processors, command language, interactive display options, file structures, and the system's capability to manage sets of selected imagery are described. A detailed example of an area coverage request is graphically presented. Author

N75-12423*# ECON, Inc., Princeton, N.J.
THE VALUE OF IMPROVED (ERS) INFORMATION BASED ON DOMESTIC DISTRIBUTION EFFECTS OF U.S. AGRICULTURE CROPS
David F. Bradford, Harry H. Kelejian, Richard Brusch, Jonathan Gross, Herbert Fishman, and Daniel Feenberg 31 Oct. 1974 114 p refs
(Contract NASw-2558)
(NASA-CR-141046; Rept-74-2001-5) Avail: NTIS HC $5.25 CSCL 02B

The value of improving information for forecasting future crop harvests was investigated. Emphasis was placed upon establishing practical evaluation procedures firmly based in economic theory. The analysis was applied to the case of U.S. domestic wheat consumption. Estimates for a cost of storage function and a demand function for wheat were calculated. A model of market determinations of wheat inventories was developed for inventory adjustment. The carry-over horizon is computed by the solution of a nonlinear programming problem, and related variables such as spot and future price at each stage are determined. The model is adaptable to other markets. Results are shown to depend critically on the accuracy of current and proposed measurement techniques. The quantitative results are presented parametrically, in terms of various possible values of current and future accuracies. N.R.

N75-12424*# ECON, Inc., Princeton, N.J.
IMPROVED (ERTS) INFORMATION AND ITS IMPACT ON U.S. MARKETS FOR AGRICULTURAL COMMODITIES: A QUANTITIATIVE ECONOMIC INVESTIGATION OF PRODUCTION, DISTRIBUTION AND NET EXPORT EFFECTS
31 Oct. 1974 154 p refs
(Contract NASw-2558)
(NASA-CR-141044; Rept-74-2001-6) Avail: NTIS HC $6.25 CSCL 05B

An econometric investigation into the markets for agricultural commodities is summarized. An overview of the effort including the objectives, scope, and architecture of the analysis and the estimation strategy employed is presented. The major empirical results and policy conclusions are set forth. These results and conclusions focus on the economic importance of improved crop forecasts, U.S. exports, and government policy operations. A number of promising avenues of further investigation are suggested. Author

N75-12425*# ECON, Inc., Princeton, N.J.
THE ROLE OF ERTS IN THE ESTABLISHMENT AND OF A NATIONWIDE LAND COVER INFORMATION SYSTEM
Philip Abram and Jay Tullos 31 Oct. 1974 302 p refs Original contains color illustrations
(Contract NASw-2558)
(NASA-CR-141045; Rept-74-2001-7) Avail: NTIS HC $9.25 CSCL 05B

The economic potential of utilizing an ERTS type satellite in the development, updating, and maintenance of a nation-wide land cover information system in the post-1977 time frame was examined. Several alternative acquisition systems were evaluated for land cover data acquisition, processing, and interpretation costs in order to determine, on a total life cycle cost basis, under which conditions of user demand (i.e., area of coverage, frequency of coverage, timeliness of information, and level of information detail) an ERTS type satellite would be cost effective, and what the annual cost savings benefits would be. It was concluded that a three satellite system with high and low altitude aircraft and ground survey team utilizing automatic interpretation and classification techniques is an economically sound proposal.
Author

N75-12426# Army Foreign Science and Technology Center, Charlottesville, Va.
LEVELING OF ELEVATIONS IN BLOCKS COMPILED FROM FLIGHT-LINE NETS IN PHOTOTRIANGULATION
V. A. Shulman 1 Apr. 1974 11 p Transl. into ENGLISH from Geodeziya Kartografiya (USSR), no. 7, 1972 p 39-43
(AD-783830; FSTC-HT-23-1564-73) Avail: NTIS CSCL 08/2

Formulation of a program for the Minsk-22 computer capable of plotting a block net of three-dimensional phototriangulation from flight-line nets of arbitrary direction is described. The maximum number of flight-line nets is 12. GRA

N75-12504 Joint Publications Research Service, Arlington, Va.
METHOD OF MEASURING AREAS BY A CURVOMETER
A. P. Kopylov *In its* Meteorology and Hydrol., No. 8, 1974 (JPRS-63560) 29 Nov. 1974 p 153-155 Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 8, 1974 p 114-115 (For availability see N75-12488 03-47)

N75-12517 Joint Publications Research Service, Arlington, Va.
APPLICATION OF EXPANSIONS WITH RESPECT TO NATURAL ORTHOGONAL COMPONENTS IN THE STUDIES OF DRAINAGE
L. L. Vilkauskas and G. I. Shatkauskas *In its* Meteorology and Hydrol., No. 9, 1974 (JPRS-63569) 2 Dec. 1974 p 99-109 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 9, 1974 p 80-87 (For availability see N75-12507 03-47)

N75-12519 Joint Publications Research Service, Arlington, Va.
FLOOD CONTROL LAWS USING ONE AND TWO RESERVOIRS WITH AN EXPONENTIAL TYPE HYDROGRAPH
L. G. Rabukhin *In its* Meteorology and Hydrol., No. 9, 1974 (JPRS-63569) 2 Dec. 1974 p 117-120 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 9, 1974 p 98-100 (For availability see N75-12507 03-47)

N75-12520 Joint Publications Research Service, Arlington, Va.
PROBLEM OF THE METHOD OF DETERMINING THE COMPOSITION OF BOTTOM DEPOSITS AND SUSPENSIONS
S. M. Antsyferov, E. L. Onishchenko, and T. F. Makarova *In its* Meteorology and Hydrol., No. 9 1974 (JPRS-63569) 2 Dec. 1974 p 121-126 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 9, 1974 p 100-103 (For availability see N75-12507 03-47)

N75-12521 Joint Publications Research Service, Arlington, Va.
TECHNOGENIC-GLACIAL MUD AND ROCK FLOW IN THE KHIBIN MOUNTAIN MASS
B. N. Rzhevskiy and V. A. Samoylov *In its* Meteorology and Hydrol., No. 9, 1974 (JPRS-63569) 2 Dec. 1974 p 127-133 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 9, 1974 p 88-92 (For availability see N75-12507 03-47)

N75-12522 Joint Publications Research Service, Arlington, Va.
CALCULATING THE DEPTH OF THE FREEZING OF SWAMPS OF THE FLAT BOG TYPE IN THE EXAMPLE OF THE TARMAN BOG
I. M. Romanova *In its* Meteorology and Hydrol., No. 9, 1974 (JPRS-63569) 2 Dec. 1974 p 134-138 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 9, 1974 p 103-106 (For availability see N75-12507 03-47)

N75-12525 Joint Publications Research Service, Arlington, Va.
LAKES OF MONGOLIA
M. K. Gavriolva, V. L. Sukhodrovskiy, and G. F. Gravis *In its* Meteorology and Hydrol., No. 9, Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 9, 1974 p 115-116 (For availability see N75-12507 03-47)

N75-12526 Joint Publications Research Service, Arlington, Va.
CONTINENTAL HYDROLOGY. TERMS AND DEFINITIONS. GOST 19179-73
V. S. Marakhovskiy *In its* Meteorology and Hydrol., No. 9, 1974 (JPRS-63569) 2 Dec. 1974 p 155-156 Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 9, 1974 p 116 (For availability see N75-12507 03-47)

N75-12737* Arizona Univ., Tucson. Steward Observatory.
THE 100 MICRON SURVEYS IN THE NORTHERN AND SOUTHERN HEMISPHERES
William F. Hoffmann and Per A. Aannestad *In* NASA. Ames Res. Center Telescope Systems for Balloon-Borne Res. Nov. 1974 p 7-16 refs Sponsored by Smithsonian Astrophysical Obs. (For availability see N75-12735 03-74)
(Grant NGR-03-002-371)
CSCL 20F

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N75-12427# Federal Energy Administration, Washington, D.C.
PROJECT INDEPENDENCE: A SUMMARY
Nov. 1974 113 p refs
Avail: SOD HC $2.00

An evaluation of the U.S. energy problem is presented which assesses the 'base case' situation through 1985 and evaluates the impacts and implications of a wide range of major energy policy alternatives, including the strategic options available to the U.S. of increasing domestic energy supply, conserving and managing energy demand, and establishing standby emergency programs. The strategies are evaluated in terms of their impact on the following variables: (1) development of alternative energy sources: (2) vulnerability to import disruptions; (3) economic growth, inflation, and unemployment; (4) environmental effects; and (5) regional and social impacts. The study provides the analytical and factual basis for focusing debate on the inherent choices and tradeoffs, and for selecting a national energy policy.
Author

N75-12428# Federal Energy Administration, Washington, D.C.
PROJECT INDEPENDENCE
Nov. 1974 788 p refs
Avail: SOD HC $8.35
For abstract, see N75-12427.

N75-12429*# National Aeronautics and Space Administration. Pasadena Office, Calif.
THERMOSTATICALLY CONTROLLED NONTRACKING TYPE SOLAR ENERGY CONCENTRATOR Patent Application
Katsunori Shimada, inventor (to NASA) (JPL) Filed 22 Nov. 1974 21 p

(Contract NAS7-100)
(NASA-Case-NPO-13497-1; US-Patent-Appl-SN-526448) Avail: NTIS HC $3.25 CSCL 10A

A solar energy concentrator is described which comprises an array of cylindrical Fresnel lenses, all of which are fixedly aligned in the East-West direction. Each lens concentrates the sun rays and forms a line image which extends in the East-West direction. Below the lenses are individual fluid channels which extend in the East-West direction and are spaced apart in the South-North direction. Each line image focuses onto two of the channels which absorb heat of the concentrated sun rays. Each channel has a thermostatically controlled valve for regulating fluid flow through the channel. NASA

N75-12430# Committee on Science and Astronautics (U. S. House).
SOLAR SEA THERMAL ENERGY
Washington GPO 1974 138 p refs Hearing before Subcomm. on Energy of Comm. on Sci. and Astronaut., 93d Congr., 2d Sess., No. 41, 23 May 1974
(GPO-37-476) Avail: Subcomm. on Energy

The hearings concerning the utilization of the ocean thermal differences as a source of energy are reported. Solar sea power produced by heat engines operating in the tropical oceans, power economics in the 1980's, and the environmental impact are discussed. F.O.S.

N75-12431# Committee on Science and Astronautics (U. S. House).
ENERGY AND ENVIRONMENTAL STANDARDS
Washington GPO 1974 960 p refs Hearings before Subcomm. on Energy of Comm. on Sci. and Astronaut., 93d Congr., 1st and 2d Sess., No. 45, 25, 27 Sep.; 4, 18 Oct. 1973
(GPO-37-171) Avail: SOD HC $7.45

The problem of environmental standards and their effects on the production and utilization of energy as related to air quality are discussed. Specific standards for sulfur and nitrogen oxide emissions are considered in regard to human health, economic damage inflicted by pollutants, and the competing needs for energy. G.G.

N75-12432# Guyol (Nathaniel B.), San Rafael, Calif.
THE APPROACHING ENERGY CRISIS: A CALL FOR ACTION
Nathaniel B. Guyol 1974 13 p
Avail: NTIS HC $3.25

The energy crisis is not a crisis but a two phase threat to our energy supplies. In the first phase, it is a threat of physical shortages and very high prices on certain petroleum products in the months immediately ahead. In the second phase it is a threat of physical shortages and very high prices on both oil and natural gas in the years ahead. Import requirements could be reduced by: (1) opening up the Elk Hills Naval Reserve; (2) ordering a one-third reduction in military use of oil; (3) reducing aviation fuel requirements by consolidating flights and schedules on competing airlines; (4) reconverting certain oil burning power plants to coal fuel. Together, these four measures alone could cut a million barrels per day from our import requirements in a period of only a few months. Author

N75-12433*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
LITHIUM-DOPED SOLAR CELL PILOT LINE FABRICATION AND TEST PROGRAMS
Paul A. Berman and Robert K. Yasui 1 Oct. 1974 82 p refs
(Contract NAS7-100)
(NASA-CR-140843; JPL-TM-33-677) Avail: NTIS HC $4.75 CSCL 10A

An investigation was conducted to determine the technology readiness of lithium-doped silicon solar cells with respect to use in space programs. A pilot line fabrication program was established, in which the pilot line cells were evaluated after being exposed to environments ordinarily imposed on nonlithium-doped silicon solar cells. Results indicate that further process improvements are required, particularly with respect to the P/N junction diffusion and the electrical contacting technique (including solder coating). It is concluded that lithium-doped cells can be fabricated to exhibit (1) high efficiencies, (2) uniform cell-to-cell recovery characteristics after exposure to 1-MeV electrons; and (3) good stability in most environments investigated (the only exception being the thermal shock environment). Author

N75-12434*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
COAL CONVERSION AND USAGE: A SYSTEMS STUDY
W. Richard Downs and Kenneth E. Cox Nov. 1974 66 p refs
(NASA-TM-X-58157; JSC-09260) Avail: NTIS HC $4.25 CSCL 10A

A comprehensive study of coal conversion and usage is presented, with emphasis on its possibilities as an interim energy source between the phaseout of petroleum and natural gas and the wide use of solar energy. Several projections of energy demands into the 21st century are included. Possibilities for the use of coal both for conversion into a variety of gas and solid fuels and for firing electric powerplants are analyzed and costs of coal-based energy, based on current technology, are discussed. A few specific methods of conversion are recommended for further research and development. Some ways to overcome environmental problems both in mining and in burning coal are also mentioned. Author

N75-12435# American Gas Association, Inc., Arlington, Va.
A SURVEY OF LNG TECHNOLOGICAL NEEDS IN THE USA: 1974 TO BEYOND 2000
L. A. Sarkes and D. B. Mann (NBS, Boulder, Colo.) 1974 22 p refs Presented at the 4th Intern. Conf. on Liquefied Nat. Gas, Algiers, 24-27 Jun. 1974
Avail: NTIS HC $3.25

A comprehensive analysis of research needs of liquefied natural gas (LNG) was conducted. LNG research priorities for five years are considered vital to overcome the potential suppression of growth in the LNG industry that could result from lack of available technology. A survey of National Bureau of Standards LNG research and how these relate to the future technological growth of the LNG industry are discussed. Author

N75-12436# Western Gear Corp., Lynwood, Calif.
ENERGY PLANTATIONS: SHOULD WE GROW TREES FOR POWER PLANT FUEL?
R. S. Evans Jul. 1974 17 p refs
(VP-X-129) Avail: NTIS HC $3.25

The proposal that trees, a renewable resource, might be cut as fuel for electric power plants is examined. It is found that the idea has doubtful promise for most regions of North America except the Pacific Northwest. Generally, annual production of wood and bark is relatively low and cutting of very large forest areas would be required to fuel a power plant of reasonable size. In the Pacific Northwest, wood and bark production in dense red alder stands is exceptionally high and the land area requirements for an energy plantation do not seem excessive. This could have practical implications for Vancouver Island, where further hydro electric development is impractical and steam-electric plants may be required. Author

N75-12437*# Radio Corp. of America, Princeton, N.J.
DESIGN, PROCESSING, AND TESTING OF LSI ARRAYS FOR SPACE STATION Quarterly Technical Report, 1 Jul. - 30 Sep. 1974
W. C. Schneider Nov. 1974 34 p ref
(Contract NAS12-2207)
(NASA-CR-120539; PRRL-74-CR-64; QTR-15) Avail: NTIS HC $3.75

At wafer probe, units of the TA6567 circuit, a beam leaded COS/MOS/SOS 256-bit RAM, were demonstrated to be functionally perfect. An aluminum gate current-sense version and a silicon-gate voltage-sense version of this memory were developed. Initial base line data for the beam lead SOS process using the TA5388 circuit show the stability of the dc device characteristics through the beam lead processing. Author

N75-12438# Council on Environmental Quality, Washington, D.C.
ENERGY AND THE ENVIRONMENT: ELECTRIC POWER
Aug. 1973 63 p refs
Avail: SOD HC $1.00

The trends in U.S. demand for energy, and the energy supply

systems intended to serve that demand are assessed, especially in regards to the adverse impacts on the environment resulting from energy production and consumption. The electric power industry is the focus of the discussion which analyzes the costs and effectiveness of various controls for currently operating fossil fuel and nuclear systems, as well as the emerging technologies which have the potential for reducing some of the attendant damages to public and ecological health. Projections of environmental consequence were formulated by combining electric energy demand forecasts with data on environmental impacts; such projections provide a baseline against which future energy policy proposals may be measured. A.A.D.

N75-12439# Kernforschungszentrum, Karlsruhe (West Germany). Inst. fuer Angewandte Systemtechnik und Reaktorphysik.
ENERGY AND THE ENVIRONMENT IN BADEN-WUERTTEMBERG
D. Faude, A. Bayer, G. Halbritter, G. Spannagel, H. Stehfest, and D. Wintzer Apr. 1974 183 p refs In GERMAN
(KFK-1966-UF) Avail: AEC Depository Libraries HC $12.25

The environmental impacts of energy production and consumption are investigated. Special emphasis is placed upon the energy conversion sector, i.e., power stations and refineries and upon the regional problems of the Upper Rhein area. Thermal and chemical emissions, and their regional distribution, are determined from a regional analysis of the energy statistics of Baden-Wurttemberg. The problem of the effects of environmental pollution is addressed by two examples: effects of ionizing radiation and epidemiological analyses of air pollution (SO2). For the regional area of the Upper Rhein the following problems are investigated in greater detail: thermal capacity of the Rhein River under various meteorological conditions; effects of wet cooling towers with natural draft; expected radiation doses from nuclear facilities; and air pollution, i.e., a map of the regional SO2-concentrations calculated from data on emissions and meteorological conditions. Author (NSA)

N75-12440# Brookhaven National Lab., Upton, N.Y.
METAL HYDRIDES AS HYDROGEN STORAGE MEDIA A Summary With Appendix
J. J. Reilly, R. H. Wiswall, K. C. Hoffman, and C. H. Waide May 1974 23 p refs Presented at 7th Alternative Automotive Power Systems Div. Contractors Coordination Meeting, Ann Arbor, Mich., 15 May 1974 Sponsored by AEC
(BNL-18887; Conf-740543-1) Avail: NTIS HC $3.25

A summary of work on metal hydrides as hydrogen storage media is given. An appendix contains information on hydride heats of formation, energy density of automotive power sources, criteria for evaluation of a candidate metal hydride, and metal hydride screening experiments. NSA

N75-12441# Brookhaven National Lab., Upton, N.Y.
IRON TITANIUM HYDRIDE AS A SOURCE OF HYDROGEN FUEL FOR STATIONARY AND AUTOMOTIVE APPLICATIONS
J. J. Reilly, K. C. Hoffman, G. Strickland, and R. H. Wiswall 1974 31 p refs Presented at 26th Power Sources Symp., Atlantic City, N. J., 29 Apr. 1974 Sponsored by AEC
(BNL-18651; Conf-740407-4) Avail: NTIS HC $3.75

Hydrogen is a potential fuel for various types of power sources, such as fuel cells, internal combustion engines, gas turbines, etc. However, a major problem is the difficulty encountered in its storage and bulk transport. A possible solution to the problem lies in the use of a metal hydride as a hydrogen storage medium. The material most near to practical application is iron titanium hydride (FeTiH1.95). This material can be synthesized through the direct union of hydrogen with the intermetallic compound, FeTi, in a two-step reaction. A stationary hydrogen storage reservoir has been built and is undergoing performance tests. The reservoir will be used in an experimental peak shaving unit being built by Public Service Electric and Gas Co. of New Jersey to examine the feasibility of storing electrical energy through the production, storage and reconversion of hydrogen. Iron titanium hydride is also of interest as a source of hydrogen fuel for automotive use. The energy density of FeTiH1.95, on the basis of available hydrogen, is 268 whr/lb; a value that compares favorably with even the most advanced battery systems suggested for automotive use. Author (NSA)

N75-12442# Oak Ridge National Lab., Tenn.
RESIDENTIAL ENERGY CONSERVATION
J. C. Moyers 1973 10 p Sponsored by AEC
(TID-26534) Avail: NTIS HC $3.25

One-third of the total electrical sales in the U. S. went to residential users in 1970. Refrigeration, water heating, space heating, and air conditioning are used most extensively in that order. An all-electric home energy consumption breakdown was made. The performance of heat pumps was computed for Atlanta, Philadelphia, and Minneapolis. The efficiency of window air conditioners was studied. The overall economic data are computed involving properly installed insulation. NSA

N75-12443# Brookhaven National Lab., Upton, N.Y.
SURVEY OF APPLICATIONS OF FUSION POWER TECHNOLOGY TO THE CHEMICAL AND MATERIAL PROCESSING INDUSTRY
M. Steinberg, M. Beller, and J. R. Powell May 1974 103 p refs Sponsored by AEC
(BNL-18866) Avail: NTIS HC $5.25

An initial survey of the application of controlled thermonuclear fusion power technology to the chemical and material processing industry was made. The general principles concerning the forms of energy, the energy conversion efficiency terms, and the process design criteria, were categorized, defined, and evaluated. A survey of potential, conventional, and advanced chemical processes is presented and capacity projections are made to the year 2000. Author (NSA)

N75-12444# Mound Lab., Miamisburg, Ohio.
DESIGN OF A HEAT SOURCE FOR A NAVY RADIOISOTOPIC POWER GENERATOR
C. G. Anderson and J. E. Selle 20 May 1974 100 p refs
(Contract AT(33-1)-GEN-53)
(MLM-2103) Avail: NTIS HC $4.75

A study conducted for the U. S. Navy determined the most economical available fuel form and encapsulation materials for use in heat sources for volume constrained, long-term, undersea applications. The PuO2 shard was shown to be the optimum fuel form; encapsulation can best be accomplished with T-111 spherically ended liner and strength member, and Hastelloy C or Inconel 625 clad. Earlier heat source programs are briefly surveyed and the present design logic is summarized. Sample calculations required to produce the desired design configurations and data necessary to change the design criteria are included. Estimated costs are presented. Author (NSA)

N75-12445# Atomic Energy Commission, Washington, D.C.
DCTR POWER SUPPLY AND ENERGY STORAGE REVIEW MEETING
D. S. Beard 1974 297 p Conf. held at Germantown, Md., 5-7 Mar. 1974
(WASH-1310; Conf-740335) Avail: NTIS HC $8.75

The present and future needs in the power supply and energy storage area are discussed. Various approaches and alternatives are presented to meet these needs. Existing capabilities and projected needs, possible approaches, inductive systems, MHD systems, switching, and capacitive systems are examined. NSA

N75-12446# Sandia Labs., Albuquerque, N.Mex.
MC2730 RADIOISOTOPIC THERMOELECTRIC GENERATOR: A DEVELOPMENT REPORT
Jun. 1974 37 p refs
(Contract AT(29-1)-789)
(SLA-74-46) Avail: NTIS HC $3.75

An overview of the Sandia Laboratories radioisotope thermoelectric generator development program as of August 1973 is presented. Author (NSA)

N75-12447# Los Alamos Scientific Lab., N.Mex.
ENERGY STORAGE FOR THE ELECTRIC POWER INDUSTRY
W. E. Keller 1973 10 p refs Presented at Conf. on Advanced Energy Systems, Denver, 20 Jun. 1974 Sponsored by AEC
(LA-UR-74-918; Conf-740641-1) Avail: NTIS HC $3.25

The following energy storage systems for leveling the energy demands from power companies are briefly discussed: (1) pumped hydrostorage (2) compressed air storage,(3) secondary batteries,

(4) liquid hydrogen storage, and (5) flywheels. Superconducting magnetic energy storage systems are also discussed. NSA

N75-12448# Army War Coll., Carlisle Barracks, Pa.
OIL FOR THE FREE WORLD IN THE 1970'S Student Essay
Eugene W. Massengale 4 Sep. 1973 21 p refs
(AD-779352) Avail: NTIS CSCL 05/3

One of the central problems facing the Western industrial powers during the seventies is whether the oil producing states of the Middle East will expand production and continue exporting. The problem is complicated by the Arab-Israeli dispute, and the intrusion of Soviet Russia into the area. The paper examines: (1) the extent of the potential shortage, and the degree to which the United States, Western Europe, and Japan will become dependent on the Middle East as a source of oil; (2) the long term reliability of the Middle East as a source of oil to the West in general, and the United States in particular; (3) the influence and aims of the Soviet Union in the region; and (4) the alternatives available to the United States. (Modified author abstract) GRA

N75-12449# RAND Corp., Santa Monica, Calif.
ENERGY CONSUMPTION BY INDUSTRIES IN SUPPORT OF NATIONAL DEFENSE: AN ENERGY DEMAND MODEL
C. C. Mow Aug. 1974 70 p refs
(Contract DAHC15-73-C-0181; ARPA Order 189-1)
(AD-784964; R-1448-ARPA) Avail: NTIS CSCL 10/1

Energy used by the manufacturing and transportation sectors of the U.S. economy in support of DoD activities is studied. Estimates are given of energy usage by various industries in support of DoD activities for 1965 and 1967 through 1970. The methodology applied in the report is sufficiently general to lend itself to estimating future industrial energy requirements for various DoD force postures and to analyzing various energy policies in a more energy-austere environment than at present. GRA

N75-12450# Catalyst Research Corp., Baltimore, Md.
MULTISHOT THERMAL BATTERY Final Report
Alan A. Schneider, Stephen E. Long, and George C. Bowser Jun. 1974 71 p refs
(Contract DAAD05-73-C-0555)
(AD-785584; LWL-CR-02E73) Avail: NTIS CSCL 10/3

A summary of the development of a multishot thermal battery is presented. The battery is designed to power the AN/PRC-77 radio for at least four ten-minute cycles. The cell of choice used a Ca anode, LiCl-KCl electrolyte and a CaCrO4 cathode (depolarizer). The choice was based primarily on electrical performance and secondarily on prior experience with the system. Tests show that both the Mg anode and FeS2 cathode would also prove acceptable. Test regimens are described and test results detailed showing that the battery will meet electrical specifications when subjected to environmental preconditionings such as heat, cold, wind, vibration and dropping. A brief description of some of the tests which led to the choice of cell chemistry is included. A chronological description of design improvements is given, from the first working prototype which was capable of four cycles to the final version which is capable of at least five reliable cycles. (Modified author abstract) GRA

N75-12451# Energy Research Corp., Bethel, Conn.
ELECTROLYTE FOR HYDROCARBON AIR FUEL CELLS Interim Report
Ralph N. Camp and Bernard S. Baker Jun. 1974 24 p refs
(Contract DAAK02-73-C-0084; DA Proj. 1T0-61102-A-34A)
(AD-784236; ERC-2597-S-3; ITR-3) Avail: NTIS CSCL 10/2

Research and results on the use of sulfonic acid electrolytes in propane air fuel cells are described. Tetrafluoroethanedisulfonic acid and octafluorobutanedisulfonic acid were used to oxidize propane and their polarization behavior is reported. Phosphoric acid is used as a reference electrolyte for measurements of overpotential vs. current density in half cells. GRA

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N75-12452# Committee on Public Works (U. S. Senate).
AUTOMOBILE EMISSION STANDARDS
Edmund S. Muskie Washington GPO 1973 24 p Rept. of Comm. on Public Works, together with supplemental and additional views to accompany S. 2772, 93d Congr., 1st Sess., 4 Dec. 1973
(S-Rept-93-598; GPO-99-109) Avail: US Capitol, Senate Document Room

The legislative extension to model year 1977 of the final compliance date for implementing baseline emission standards for automobiles, and for establishing test procedures for the certification of emission controls on light duty vehicles and engines was the subject of a report to Congress. Information which supplements the view that air quality improvements are vital to public health and environmental welfare is given, along with additional data concerning fuel economy, the adverse effects of oxides of nitrogen, and the implications of air quality goals for transportation. The dilemma of the energy crisis versus pollution control criteria is discussed. A.A.D.

N75-12453# Research Inst. of National Defence, Sundbyberg (Sweden).
METHODS OF CLEANING AND SERVICING AIR SUPPLIES, AND THEIR CONTROL [LUFTRENING OCH LUFTFOERSOERJNING METODER OCH KONTROLL]
Goesta Lindner Mar. 1973 36 p refs In SWEDISH
(FOA-1-A-1561-H3) Avail: NTIS HC $3.75

In recent years there has been considerable interest in the cleaning of air, arising mainly from the steadily increasing discharge of sulphurdioxide, carbon monoxide and nitrous oxides, etc. Methods of cleaning gas from gaseous impurities without chemical reactions are available by absorption, adsorption, molecular sieve and condensation, whilst those methods with chemical reaction include absorption and heterogeneous catalysis as well as combustion. The air or gas often carries particles of impurities in the form of different large vapor droplets, bacteria or solid particles. Air cleaning in these cases is achieved by separation in different filters and centrifuges. In enclosed spaces with important military applications there is also a demand for lower contamination content and for air maintenance so that normally harmless gases such as carbon dioxide are removed. Author

N75-12454# Research Inst. of National Defence, Sundbyberg (Sweden).
METHODS FOR ANALYSIS OF NITROGEN MONOXIDE AND NITROGEN DIOXIDE IN THE ATMOSPHERE AND IN EXHAUST GASES. A LITERATURE SEARCH [ANALYSMETODER FOER KVAEVEMONOXID OCH KVAEVEDIOXID I ATMOSFAEREN OCH I AVGASER EN LITTERATURGENOMGANG]
Kjell Bergqvist Oct. 1972 22 p refs In SWEDISH
(FOA-1-C-1469-H3) Avail: NTIS HC $3.25

Methods for analyzing NO and NO2 in air, smoke and motor car exhausts are reviewed. In the case of nitrous oxides, which are mainly from the exhaust gases of motor cars, there is no perfect method of analysis at present. Hitherto the best method of analysis has been by ozone chemical luminescence for which the instruments cost 40,000 to 50,000 kr, and cover a range of concentration from the hygienic value of 0.001 ppm to proportions of 1000 ppm, i.e. 1% by volume of nitrous oxides. The problem of calibration in the analysis methods is also affected by the technique of taking samples. Author

N75-12455# Research Inst. of National Defence, Stockholm (Sweden).
EXPERIMENTS WITH A CATALYTIC CLEANER FOR CAR ENGINE EXHAUST GASES [INVERKAN AV PULSERANDE AVGASSTROEM PA OMSAETTNINGEN AV KOLMONOXID I EN KATALYSATORBAEDD]
Kjell Beagqvist Dec. 1972 19 p refs In SWEDISH
(FOA-1-C-1492-H3) Avail: NTIS HC $3.25

Trials have been made with a fixed layer of a catalyst through

which the exhaust gas flows radially. This was used to determine the extraction of carbon monoxide from pulsed exhaust gases from a Volvo B18 engine. The layer of catalyst consisted of 0.1% platinum on spherical grains of aluminium oxide. Pulses of exhaust gas were produced with the aid of an oscillating fluidic valve. The tests revealed no difference in carbon monoxide extraction with forced pulses of gas at a frequency of 35 Hz by comparison with normal flow through the catalyst layer. The addition of air varying quantities had a great influence on the extraction. Author

N75-12456# Argonne National Lab., Ill.
ANALYTICAL MODELING OF THERMAL DISCHARGES. A REVIEW OF THE STATE OF THE ART
B. A. Benedict, J. L. Anderson, and E. L. Yandell, Jr. Apr. 1974 321 p refs
(Contract W-31-109-eng-38)
(ANL/ES-18) Avail: NTIS HC $9.25

Available techniques for mathematical modeling for discharges of heated waters into rivers and lakes and for the operation of cooling ponds are described. General factors affecting heated-water discharges are discussed, including entrainment and diffusion, receiving-water stratification and flow rate, among others. The general elements of the heat budget are also reviewed. For all models presented, assumptions and model limitations are included, along with the basic theory, necessary equations, available verification, and numerical examples. Four models for surface discharges of heated water are reviewed in depth. Several others are referenced. Submerged discharges, both single and multiple port, are covered. Cooling-pond analysis emphasizes idealized pond behavior, with discussion on the behavior and analysis of real ponds. The effect of choice of evaporation formula on pond design is assessed. Author (NSA)

N75-12457# Argonne National Lab., Ill.
FIELD INVESTIGATIONS OF HEATED DISCHARGES FROM NUCLEAR POWER PLANTS ON LAKE MICHIGAN, 1972
A. A. Frigo, D. E. Frye, and J. V. Tokar Mar. 1974 241 p refs
(Contract W-31-109-eng-38)
(ANL/ES-32) Avail: NTIS HC $7.50

A partial compilation is presented of thermal-plume field data collected during 1972 by the Energy and Environmental Systems Division of Argonne National Laboratory. Thirty thermal plumes are presented, 15 each for the Point Beach and Palisades Nuclear Power Plants-both located on Lake Michigan. The 1972 data, together with studies performed in previous years, were obtained to demonstrate the variability of plume configurations under a wide range of environmental conditions and collectively are being used to test the validity of several widely used predictive model formulations. General observations of the field data in relation to ambient lake and meteorological conditions are presented. A more detailed analysis of the data will be reported separately. Author (NSA)

N75-12458# Argonne National Lab., Ill.
DISPERSION SIMULATION TECHNIQUES FOR ASSESSING THE AIR POLLUTION IMPACTS OF GROUND TRANSPORTATION SYSTEMS
L. J. Habegger, T. D. Wolsko, J. E. Camaioni, D. A. Keller-meyer, and P. A. Dauzvardis Apr. 1974 101 p refs
(Contract W-31-109-eng-38)
(ANL/ES-29) Avail: NTIS HC $5.25

Various mathematical models for air dispersion are surveyed and evaluated in terms of their applicability to estimation of pollutant concentration in the vicinity of roadways. The Gaussian steady-state dispersion model is considered and extensive field studies are used to validate this model in the region within 500 feet of the edge of both an at-grade roadway and a depressed roadway. The calibrated Gaussian model is used to formulate techniques for estimating annual one-hour and eight-hour maximum concentrations resulting from roadway emissions. Author

N75-12459# Varian Associates, Palo Alto, Calif.
AIRBORNE VAPOR SURVEILLANCE SYSTEM Final Report
James T. Arnold and Paul Robbiano Jun. 1974 45 p refs
(Contract DAAD05-70-C-0197)
(AD-785585; LWL-CR-03P68B) Avail: NTIS CSCL 07/4

The report describes a transportable membrane separator-mass spectrometer system for the detection of trace vapors in ambient atmosphere. It employs a Llewellyn membrane separator, a quadrupole mass filter, and an on line system for data processing and display. Design electronics, and software are discussed, and installations in a mobile van and a fixed-wing aircraft are described. GRA

N75-12460# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
IN THE INTERESTS OF CLEAN AIR
22 Aug. 1974 5 p Transl. into ENGLISH from Rabochaya Gazeta (USSR), no. 46, Feb. 1974 p 3
(AD-785206; FTD-HT-23-0002-75) Avail: NTIS CSCL 13/2

The report briefly describes an air quality monitoring system in Kiev, Ukraine. GRA

N75-12461# Army Materiel Command, Alexandria, Va.
ENGINEERING DESIGN HANDBOOK: ENVIRONMENTAL SERIES. PART ONE: BASIC ENVIRONMENTAL CONCEPTS
31 Jul. 1974 223 p refs
(AD-784999; AMCP-706-115) Avail: NTIS CSCL 13/2

This handbook, Basic Environmental Concepts, is the first in a series on the nature and effects of the environmental phenomena. Part One introduces the importance of the environment; i.e., its effects, the factors of the environment, the complex combinations of the environment that occur, quantitative environmental concepts, and the testing of materiel and simulation of the environment. The categorization of materiel as it exists and relates to environmental effects also is discussed. Part One introduces in a general and qualitative manner those factors that are to be treated quantitatively in the succeeding volumes. GRA

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation.*

N75-12462*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
APPLICATION OF A SINGLE LASER DOPPLER SYSTEM TO THE MEASUREMENT OF ATMOSPHERIC WINDS
William C. Cliff and Robert M. Huffaker Oct. 1974 23 p refs
(NASA-TM-X-64891) Avail: NTIS HC $3.25 CSCL 04B

The feasibility of employing a single laser Doppler velocimeter (LDV) system to remotely measure one-, two-, and three-dimensional velocity components in atmospheric flow fields is presented. A focused continuous wave CO2 laser emitting at the 10.6 mu wavelength is used as the laser source. Scan configurations employed by the LDV system were single-point, two-point, conical, and spiral conical. Test results are presented, which include favorable comparisons of velocity components measured by conventional anemometry and the LDV system. The feasibility using a single-beam LDV employing a conical scan technique for measuring two- and three-dimensional mean winds. Measurements to 300 m in dense fogs showed the ability of the LDV system to operate in dense fogs. Author

N75-12463*# Scientific Translation Service, Santa Barbara, Calif.
DUST STORMS ACCORDING TO DATA OF SPACE RESEARCH
A. A. Grigoryev and V. B. Lipatov Washington NASA Nov. 1974 39 p refs Transl. into ENGLISH of the book "Pylnyye Buri po Dannym Kosmicheskikh Issledovaniy" Moscow, Hydrometeorological Press, 1974 p 1-31
(Contract NASw-2483)
(NASA-TT-F-16021) Avail: NTIS HC $3.75 CSCL 08E

The main regions of dust storms in the arid and sub-arid zones and the transfer paths of the dust materials were studied. Relationships between the dust storms and synoptic character and composition of the underlying surfaces are analyzed. The

feasibility of studying the dynamics of these phenomena using space imagery is shown. The possibility of using microphotometry from TV pictures is considered for estimating the structure of dust storms. Author

N75-12464*# Grambling State Univ., La. Dept. of Mathematics.
A PROPOSAL TO STUDY POLARIZATIONS FOR HYDROMAGNETIC WAVES OBSERVED AT ATS-1 Final Report
N. Gajendar 7 Nov. 1974 17 p refs
(Grant NGR-19-011-013)
(NASA-CR-140857) Avail: NTIS HC $3.25 CSCL 03B

Data collected from a magnetometer onboard ATS-1 indicate that at least three types of oscillations occur: oscillations with the magnetic component (1) prependicular to the background field, (2) parallel to the background field, and (3) in the meridional plane. Two modes of polarization were found to exist, parallel and perpendicular modes. Author

N75-12465# Research Inst. of National Defence, Stockholm (Sweden).
SEISMIC MAGNITUDES FROM EXPLOSIONS AND EARTHQUAKES OBTAINED AT THE HAGFORS AND MATSUSHIRO OBSERVATORIES
Hans Israelson and Masahiro Yamamoto Feb. 1972 24 p refs
(FOA-C-20010-T1) Avail: NTIS HC $3.25

A set of seismic events was acquired with body waves and surface wave magnitudes determined at the Hagfors (HFS) and Natsushiro (MAT) observatories. A systematic search of seismic events in mainland U.S.S.R. was performed. A total of 7 presumed underground nuclear explosions and 23 shallow earthquakes were found with both body and surface wave determinations at both stations. Differences between the determined values were examined. It was found that the difference in the body wave values was a function of the periods of the shortperiod P-waves, such that at shorter periods the values at HFS were consistently larger than at MAT. The difference in surface wave values, which was most pronounced for explosions, can mostly be ascribed to different instrumental response and to different travel paths. Author

N75-12466# Weapons Research Establishment, Salisbury (Australia).
MEASUREMENTS OF THE BASIC ATMOSPHERIC PARAMETERS AT WOOMERA USING THE FALLING SPHERE, AUGUST TO NOVEMBER 1973
P. H. O. Pearson Sep. 1974 31 p refs
(WRE-TN-1246(WR-D)) Avail: NTIS HC $3.75

Falling sphere experiments were conducted on a monthly basis at approximately 6 deg solar depression in the evening about 30 min after sunset. Results are presented for wind components; but only two sets of results for density, temperature and pressure were obtained, owing to problems associated with the vehicles and sphere inflation. Author

N75-12467# Defence Research Establishment Ottawa (Ontario). Research and Development Branch.
AN EXAMINATION OF WHITEOUTS AND TRANSMISSION THROUGH ICE FOG IN THE VISIBLE AND NEAR INFRARED
R. J. Brown, J. D. R. Pattman, and D. J. DiFruscio Jul. 1974 20 p refs
(DREO-TN-74-18) Avail: NTIS HC $3.25

Closed circuit television was investigated as a means of improving contrast during whiteout conditions at Yellowknife, N.W.T., in December, 1973. Cameras sensitive in the visible and near infrared portions of the electromagnetic spectrum were used. It is predicted that the reduction of snow reflectance in the near infrared might improve contrast perception in this region over that in the visible. Further studies included an investigation of the ability of these cameras to penetrate ice fog and the measurements of sky illuminance using a four spectral channel radiometer. No appreciable advantage over unaided eye observations was detected, and, in most cases, binoculars provided the most effective visual aid. Author

N75-12468# Joint Publications Research Service, Arlington, Va.
SEISMIC FORERUNNERS OF DESTRUCTION
O. G. Shamina and S. A. Strizhkov 14 Nov. 1974 6 p refs Transl. into ENGLISH from Dokl. Akad. Nauk SSSR (Moscow), v. 217, no. 6, 1974 p 1307-1309
(JPRS-63441) Avail: NTIS HC $3.25

Experiments designed to study seismic waves as they pass across the seismic focus of an earthquake are discussed. Author

N75-12469*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A MID-LATITUDE OZONE MODEL FOR THE US STANDARD ATMOSPHERE, 1975 (SUMMARY)
Arlin J. Krueger and Raymond A. Minzner Sep. 1974 20 p refs Submitted for publication
(NASA-TM-X-70786; X-912-74-291) Avail: NTIS HC $3.25 CSCL 04A

A mid-latitude, Northern-Hemisphere model of the daytime ozone distribution in the troposphere, stratosphere, and lower mesosphere was constructed. Data from rocket soundings in the latitude range 45 deg N + or - 15 deg, results of balloon soundings at altitudes from 41 to 47 deg N, and latitude gradients from satellite ozone observations were combined to produce estimates of the annual mean ozone concentration and its variability at heights to 72 km for an effective latitude of 45 deg N. The model is a revision, for heights above 26 km, of the tentative Mid-Latitude Ozone Model. Author

N75-12470# Research Inst. of National Defence, Stockholm (Sweden).
SEISMIC EVENTS IN THE USSR IN 1972
Atle Austegard Nov. 1974 35 p refs
(FOA-C-20018-T1) Avail: NTIS HC $3.75

A list of seismic events in mainland U.S.S.R. was compiled from bulletin data, given by the National Oceanic and Atmospheric Administration U.S. (NOAA), the Institute of Physics of the Earth, Moscow (MOS), and the Hagfors Observatory (HFS) in Sweden. In addition data from the large aperture arrays NORSAR in Norway and LASA in U.S. are utilized. Regional seismicity, focal depths, magnitudes and discrimination between explosions and earthquakes are studied. MOS and NOAA were found to give concordant depth estimates which for most of the events agreed within 30 km. In some cases SS phases recorded at HFS provided valuable information on the focal depth. Earthquakes recurrence relations for the body wave magnitude were studied and minor regional variations were observed. The discrimination procedure was applied to the data and gave satisfactory results. Author

N75-12471# Research Inst. of National Defence, Stockholm (Sweden).
A STUDY OF LITERATURE ON METHODS TO DETERMINE THE EFFECT ON VISIBILITY OF THE ATMOSPHERIC PARTICLE CONCENTRATION, SIZE AND DISTRIBUTION [LITTERATURSTUDIE OEVER METODER ATT BESTAEMMA ATMOSFAERENS SIKTPAVER-KANDE PARTIKLARS KONCENTRATION OCH STORLEKSFOERDELNING]
Evald vonZeipel Mar. 1973 13 p refs In SWEDISH
(FOA-2-C-2606-E1) Avail: NTIS HC $3.25

The recording and collection of airborne particles that affect visibility together with a list of references in literature are reported. In addition, principles are proposed for an electrostatic particle separator. Author

N75-12472# Research Inst. of National Defence, Stockholm (Sweden).
THE E REGION OF THIS IONOSPHERE AT NIGHT TIME: A LITERATURE STUDY [JONOSFAERENS E-REGION NATETID - EN LITTERATURSTUDIE]
Ake Hedberg Jan. 1973 27 p refs In SWEDISH
(FOA-3-C-3731-E1) Avail: NTIS HC $3.75

In order to obtain information about the ionospheres E-region during the night, (night E), and the processes which control this region, publications on this subject have been examined. The study covered 45 publications issued during the year from 1950 to 1972. Author

N75-12473*# Pittsburgh Univ., Pa. Dept. of Physics.
STUDIES OF THE AIRGLOW, THE AURORA, THE ION AND NEUTRAL COMPOSITION, AND THE CHEMISTRY OF THE TERRESTRIAL ATMOSPHERE
E. C. Zipf, Jr. 30 Sep. 1974 30 p refs
(Grant NGR-39-011-113)
(NASA-CR-140960) Avail: NTIS HC $3.75 CSCL 04A

Results obtained by rocket-borne optical spectrometry are presented. Composition measurements and auroral studies are reported. The production of N (D-2) atoms by photo-absorption processes, and by electron impact excitation of N2 are discussed along with vibrationally excited CO2(+) ions in planetary atmospheres. F.O.S.

N75-12474# Michigan Univ., Ann Arbor. Dept. of Atmospheric and Oceanic Science.
NUMERICAL MODELS FOR PRECIPITATION SCAVENGING Ph.D. Thesis
Y. Lee Apr. 1974 98 p refs
(Contract AT(11-1)-1407)
(COO-1407-52) Avail: NTIS HC $4.75

This model incorporates heuristic approximations of diffusive attachment, impact collection and accretion, and includes consideration of particle and cloud droplet size spectra. An overriding, independently generated steady rain removes contaminated cloud droplets and contaminant particles. The conservation of contaminant mass is expressed by a set of three ordinary differential equations for which analytic solutions are derived. Rainout ratios and efficiencies are computed, and the results compare favorably with available field measurements.
Author (NSA)

N75-12475# Epsilon Labs., Bedford, Mass.
BALLOON-BORNE AEROSOL COUNTER MODIFICATIONS, PARTICLE SIZING ACCURACY TESTS Final Report, 1 Nov. 1973 - 15 Sep. 1974
Henry A. Miranda, Jr., John Dulchinos, and Henry P. Miranda Jul. 1974 32 p refs
(Contract F19628-74-C-0078; AF Proj. 7621)
(AD-784866; FR-2003-74; AFCRL-TR-74-0349) Avail: NTIS CSCL 04/1

This report describes refurbishing work performed on the AFCRL aerosol counter which had sustained damage on the last of three successive stratospheric balloon flights in 1973. Certain improvements in the signal processing circuitry and associated software, which simplify the background level determination procedure and generate useful in-flight diagnostic information, are also described. In addition the results of exploratory tests to examine the combined effects of polarized illumination and particle shape as well as index of refraction on the sizing accuracy of the counter, are presented. Particles from several types of polishing compounds were nebulized and the size distribution as measured by the aerosol counter were compared with scanning electron microscope data.
Author (GRA)

N75-12476# Environmental Technical Applications Center (Air Force), Washington, D.C.
ATMOSPHERIC MOISTURE PARAMETERIZATION
Robert D. Smith Jan. 1974 26 p refs
(AD-784814; USAFETAC-TN-74-1) Avail: NTIS CSCL 04/2

Requirements exist for estimation of the spatial distribution of liquid and solid water in the atmosphere. Evaluation of previous research indicates that the magnitude of the water at a point can be approximated from the temperature and the type of cloud that exist at that point along with the relative position of the point in the cloud itself. Thermodynamic phase of the water, what portion is liquid or solid, can be generalized from the temperature of the point. The drop-size distribution can be determined by assuming that the available water is found in distributions typical of various types of clouds. Author (GRA)

N75-12477# Fraunhofer-Gesellschaft, Garmisch-Partenkirchen (West Germany).
BOUNDARY LAYER AEROSOL TRANSPORT MEASUREMENTS IN A VALLEY SYSTEM Final Technical Report
Reinhold Reiter Jan. 1974 35 p refs
(Contract DAJA37-73-C-1806)
(AD-781010/4) Avail: NTIS HC $3.75 CSCL 04/2

Preparations were made for the performance of a field experiment concerning the dispersion of fluorescent test aerosol particles within a mountain valley. Essentially they included the construction of 20 rotorod samplers and of 100 H-shaped vanes therefore. The samplers were improved by a new electronic circuit to ensure constant speed of the vanes even if battery voltage drops. A microscopical bench was installed for the counting of fluorescent particles in UV light. The procedure for exact determination of air currents in the valley experiment using pilot balloons was further developed and respective computer programs set up.
Author (GRA)

N75-12478# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CALCULATION OF THE ABSORPTION OF X-RAY RADIATION IN THE EARTH'S ATMOSPHERE
I. A. Kuzmin, L. L. Lazutin, and L. A. Khlebnikova 22 Aug. 1974 25 p refs Transl. into ENGLISH from the monograph "Kompleksnye Issledovaniya Polyarnoi Ionosfery" 1970 p 159-176
(AD-785110; FTD-MT-24-1980-74) Avail: NTIS CSCL 04/1

Measuring bremsstrahlung in the stratosphere is one of the methods of studying the electron flows responsible for the majority of geomagnetic disturbances at high latitudes. However, the interpretetion of stratospheric measurements involves a number of difficulties which appear when scaling the recorded X-ray radiation to an electron flow. The scaling procedure in accordance with the physical sense of the process consists of two stages: (1) calculation of the initial flow and spectrum of photons at the generation level with respect to the flow at the detection level; (2) calculation of electron flow with respect to the flow of bremsstrahlung photons. In the present work the authors examined the first stages, i.e., calculation of the passage of X-ray radiation through the upper layers of the atmosphere.
GRA

N75-12479# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
AEROSTATIC MEASUREMENTS OF THE VERTICAL DISTRIBUTION OF THE ATMOSPHERIC AEROSOL
L. S. Ivlev and O. M. Surikov 21 Aug. 1974 11 p Transl. into ENGLISH from Probl. Fiz. Atm. (USSR), no. 6, 1968 p 59-63
(AD-785114; FTD-HT-23-2116-74) Avail: NTIS CSCL 04/1

Aerostatic measurement of the vertical distribution of the atmospheric aerosol were made using impactor-type aerosol traps. Four launches were made in all. Results are discussed. GRA

N75-12480# Rosenstiel School of Marine and Atmospheric Sciences, Miami, Fla.
MODELLING GEOMAGNETIC POLARITY TRANSITIONS M.S. Thesis
Edward Ramirez Aug. 1974 104 p refs
(Contract N00014-67-A-0201-0013; NR Proj. 083-060)
(AD-785255) Avail: NTIS CSCL 08/14

Through paleomagnetic research, it has been found that the earth's dipole moment alternates between two antiparallel polarity states, a normal state, in which the field at the surface is directed northward, and a reversed state in which the field has the opposite direction. From the analysis of several of these transitions two models have been proposed to describe the geomagnetic field during this period. In this study dipole models of the geomagnetic field, as derived by Alldredge and Hurwitz (1964) and Alldredge and Stearns (1969), were used to study polarity transitions. The results tend to suggest that one model, not two, can explain all the effects observed during a transition.
GRA

N75-12481# Aerospace Corp., El Segundo, Calif. Lab. Operations.
A THREE-DIMENSIONAL NUMERICAL MODEL OF THE UPPER ATMOSPHERE. VOLUME 2: STEADY-STATE SOLUTIONS FOR A SINGLE-FLUID MODEL WITH A FIXED TEMPERATURE FIELD Technical Report, Jul. 1972 - Dec. 1973
Joe M. Straus, Stephen P. Creekmore, Robert M. Harris, Barbara K. Ching, and Yam T. Chiu 15 Feb. 1974 87 p refs

(Contract F04701-73-C-0074)
(AD-778420; TR-0074(9260-06)-1-Vol-2;
SAMSO-TR-74-70-Vol-2) Avail: NTIS CSCL 04/1

The report is the second in a series of volumes that describe calculations carried out with a numerical model of the thermosphere developed at The Aerospace Corporation. Calculations that deal with a single-fluid upper atmosphere of variable molecular weight are described. This molecular weight varies from about 25 amu at 120 km, characteristic of a mixture of molecular nitrogen and molecular and atomic oxygen, to about 15 amu at 500 km, characteristic of a mixture of atomic oxygen and helium. The temperature field is assumed to be a fixed input quantity taken from a phenomenological model. The horizontal and vertical wind fields and the density of the thermosphere are discussed, with particular attention given to the diurnally averaged wind fields. Comparisons are made with previous theoretical and observational investigations.

Author (GRA)

N75-12491 Joint Publications Research Service, Arlington, Va.
METHOD OF INTEGRATING THE SPECTRAL EQUATIONS OF THE PLANETARY DYNAMICS OF THE ATMOSPHERE
V. A. Yefimov *In its* Meteorology and Hydrol., No. 8, 1974 (JPRS-63560) 29 Nov. 1974 p 19-33 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 8, 1974 p 17-28 (For availability see N75-12488 03-47)

N75-12493 Joint Publications Research Service, Arlington, Va.
RELATION OF THE WIND AND BARIC FIELDS IN THE STRATOSPHERE AND THE LOWER MESOSPHERE OF THE TROPICAL ZONE OF THE NORTHERN HEMISPHERE
L. S. Minyushina *In its* Meteorology and Hydrol., No. 8, 1974 (JPRS-63560) 29 Nov. 1974 p 44-54 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 8, 1974 p 37-45 (For availability see N75-12488 03-47)

N75-12494 Joint Publications Research Service, Arlington, Va.
ATMOSPHERIC PROCESSES IN THE 30-60 km LAYER IN 1971 - 1973
I. V. Bugayeva and L. A. Ryazanova *In its* Meteorology and Hydrol., No. 8, 1974 (JPRS-63560) 29 Nov. 1974 p 55-66 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 8, 1974 p 46-55 (For availability see N75-12488 03-47)

N75-12495 Joint Publications Research Service, Arlington, Va.
STATISTICAL CHARACTERISTICS OF THE VERTICAL MOISTURE PROFILE IN THE CASE OF CUMULUS CLOUDS
N. P. Tverskaya *In its* Meteorology and Hydrol., No. 8, 1974 (JPRS-63560) 29 Nov. 1974 p 67-78 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 8, 1974 p 56-64 (For availability see N75-12488 03-47)

N75-12498 Joint Publications Research Service, Arlington, Va.
EFFECT OF BOTTOM RELIEF ON THE GEOSTROPHIC WIND CURRENTS
L. V. Moskalenko *In its* Meteorology and Hydrol., No. 8, 1974 (JPRS-63560) 29 Nov. 1974 p 100-109 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 8, 1974 p 80-87 (For availability see N75-12488 03-47)

N75-12500 Joint Publications Research Service, Arlington, Va.
SOME CHARACTERISTICS OF THE VERTICAL STRUCTURE OF TROPOSPHERIC CURRENTS IN THE TROPICAL REGIONS OF THE EAST ATLANTIC
N. A. Zavelskaya *In its* Meteorology and Hydrol., No. 8, 1974 (JPRS-63560) 29 Nov. 1974 p 121-126 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 8, 1974 p 96-99 (For availability see N75-12488 03-47)

N75-12502 Joint Publications Research Service, Arlington, Va.
BASIC GOALS AND SOME RESULTS OF THE SOVIET NATIONAL EXPEDITION TROPEX-72 (6 JUNE - 19 SEPTEMBER 1972)
M. A. Petrosyants *In its* Meteorology and Hydrol., No. 8, 1974 (JPRS-63560) 29 Nov. 1974 p 133-146 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 8, 1974 p 103-110 (For availability see N75-12488 03-47)

N75-12506 Joint Publications Research Service, Arlington, Va.
TURBULENT DIFFUSION IN THE ENVIRONMENT
M. Ye. Berlyand *In its* Meteorology and Hydrol., No. 8, 1974 (JPRS-63560) 29 Nov. 1974 p 159-176 ref Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 8, 1974 p 117-118 (For availability see N75-12488 03-47)

N75-12509 Joint Publications Research Service, Arlington, Va.
COMPLEX STUDIES OF THE STRATOSPHERIC AEROSOL
K. Ya. Kondratyev, L. S. Ivlev, and G. A. Nikolskiy *In its* Meteorology and Hydrol., No. 9, 1974 (JPRS-63569) 2 Dec. 1974 p 18-32 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 9, 1974 p 16-26 (For availability see N75-12507 03-47)

N75-12511 Joint Publications Research Service, Arlington, Va.
NEW VERSION OF THE PROGRAM FOR OPERATIVE OBJECTIVE ANALYSIS OF THE GEOPOTENTIAL OF ISOBARIC SURFACES
A. K. Artanova *In its* Meteorology and Hydrol., No. 9, 1974 (JPRS-63569) 2 Dec. 1974 p 41-49 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 9, 1974 p 34-40 (For availability see N75-12507 03-47)

N75-12514 Joint Publications Research Service, Arlington, Va.
STUDY OF THE HEAT BALANCE IN THE BOUNDARY LAYER OF THE ATMOSPHERE ACCORDING TO EXPERIMENTAL DATA
L. A. Klyuchnikova, N. A. Lazareva, and L. R. Orlenko *In its* Meteorology and Hydrol., No. 9, 1974 (JPRS-63569) 2 Dec. 1974 p 72-81 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 9, 1974 p 60-66 (For availability see N75-12507 03-47)

N75-12516 Joint Publications Research Service, Arlington, Va.
TOTAL HEAT TRANSFER TO THE ATMOSPHERE FROM THE OCEAN SURFACE IN THE VICINITY OF FORMATION OF HURRICANE HILDA
N. T. Glinskiy and L. A. Kolesnikova *In its* Meteorology and Hydrol., No. 9 1974 (JPRS-63569) 2 Dec. 1974 p 92-98 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 9, 1974 p 75-97 (For availability see N75-12507 03-47)

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N75-12482 Direction de la Meteorologie Nationale, Paris (France).
EVAPOTRANSPIRATION: AGROMETEOROLOGICAL ASPECT AND EVALUATION OF POTENTIAL EVAPOTRANSPIRATION [L'EVAPOTRANSPIRATION: ASPECT AGROMETEOROLOGIQUE, EVALUATION PRATIQUE DE L'EVAPOTRANSPIRATION POTENTIELLE]
P. Brochet and N. Gerbier Mar. 1974 100 p refs In FRENCH Revised
(Mono-65) Avail: Issuing Activity

The concept of potential evapotranspiration (ETP) in relation to water transfer is detailed with regard to energetic, climatic, bioclimatic, and agronomic aspects. The latter are divided in considerations on soil water resources, agriculture water balance, and practical applications of ETP. The evaluation of ETP is discussed with regard to measurements and calculation by means of the formulae due to Thornwaite, Turc, Penman, and Piche corrected by Bouchet. The estimation of the first coefficient in the Bouchet formula is reviewed with regard to direct estimation method, agroclimatic index method and its calculation, and practical use of the Piche corrected formula. Two expressions of the simplified energetic balance method are given. ESRO

N75-12483 Direction de la Meteorologie Nationale, Paris (France).
GENERAL PHYSICAL CHARACTERISTICS OF MISTS [CARACTERISTIQUES PHYSIQUES GENERALES DES BROUILLARDS]

G. Tschirhart Jun. 1974 51 p refs In FRENCH
(Mono-92) Avail: Issuing Activity

General aspects of mist including climatology, properties in relation to air pollution, and properties of artificial thermal mists, are presented. The microphysical structure of mist is discussed, notably condensation nuclei, particle phases, drop ray distribution, and volumetric concentration of mist drops. Aerological conditions are dealt with and mist formation processes are presented.
ESRO

N75-12484 Direction de la Meteorologie Nationale, Paris (France). Section de Meteorologie Maritime.
CLIMATOLOGICAL ELEMENTS OF THE COASTS OF METROPOLITAN FRANCE (ATLANTIC) [ELEMENTS CLIMATOLOGIQUES CONCERNANT LES COTES DE LA FRANCE METROPOLITAINE (ATLANTIQUE)]
J. Darchen Jun. 1974 115 p In FRENCH
(Mono-93-Vol-2) Avail: Issuing Activity

Meteorological data on wind force and direction, sea state, visibility, and temperature, derived from measurements along the French Atlantic coast in Ouessant, Le Talut, Chassiron, La Coubre, Cap Ferret, and Socoa-Biarritz, between 1950 and 1960, are tabularized. Wind frequencies during strong winds between 1956 and 1965 as measured at the point 45 deg N and 16 deg W are given.
ESRO

N75-12485 Direction de la Meteorologie Nationale, Paris (France). Section de Meteorologie Maritime.
CLIMATOLOGICAL ELEMENTS OF THE COASTS OF METROPOLITAN FRANCE (NORTH SEA, CHANNEL) [ELEMENTS CLIMATOLOGIQUES CONCERNANT LES COTES DE LA FRANCE METROPOLITAINE (MER DU NORD-MANCHE)]
J. Darchen Jun. 1974 116 p In FRENCH
(Mono-93-Vol-1) Avail: Issuing Activity

Meteorological data on wind force and direction, sea state, visibility, and temperature, derived from measurements along the French North Sea and channel coast in Dunkerque, Boulogne, Dieppe, La Heve, La Hague, and Brehat between 1950 and 1960, are tabularized.
ESRO

N75-12486 Direction de la Meteorologie Nationale, Paris (France). Section de Meteorologie Maritime.
CLIMATOLOGICAL ELEMENTS OF THE COASTS OF METROPOLITAN FRANCE (MEDITERRANEAN) [ELEMENTS CLIMATOLOGIQUES CONCERNANT LES COTES DE LA FRANCE METROPOLITAINE (MEDITERRANEE)]
J. Darchen Jun. 1974 146 p In FRENCH
(Mono-93-Vol-3) Avail: Issuing Activity

Meteorological data on wind force and direction, sea state, visibility, and temperature, derived from measurements along the French Mediterranean coast, including Corsica, in Cap Bear, Sete, Pomegues, Cap Camarat, Cap Ferrat, Corse, and Pertusato between 1950 and 1960, are tabularized. Statistical data on wind, waves, sea, and air temperature as measured in Large de Marseille between 1954 and 1961 are given.
ESRO

N75-12487# Bureau of Reclamation, Denver, Colo.
PROJECT SKYWATER Annual Report, 1972
Nov. 1973 487 p refs
(REC-ERC-73-17) Avail: NTIS HC $12.00

The Bureau of Reclamation's precipitation management activities in fiscal year 1972 are summarized, and the advances made under the research program to date are discussed. The project goals and depth are outlined and reports prepared by the participants in Project Skywater are presented.
Author

N75-12488# Joint Publications Research Service, Arlington, Va.
METEOROLOGY AND HYDROLOGY, NO. 8, 1974
29 Nov. 1974 181 p refs Transl. into ENGLISH of Meteorol. Gidrol. (Moscow), no. 8, 1974 120 p
(JPRS-63560) Avail: NTIS HC $7.00

Articles are presented on microclimate, agricultural meteorology, weather forecasting and climate control, hydrological forecasting, the activities and personnel of the Soviet Hydrometeorological Service, and new publications. For individual titles, see N75-12489 through N75-12506.

N75-12489 Joint Publications Research Service, Arlington, Va.
FIFTIETH ANNIVERSARY OF THE BELORUSSIAN HYDROMETEOROLOGICAL SERVICE
A. A. Glomozda *In its* Meteorology and Hydrol., No. 8, 1974 (JPRS-63560) 29 Nov. 1974 p 1-9 Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 8, 1974 p 3-9 (For availability see N75-12488 03-47)

The history of the creation of the Belorussian Hydrometeorological Service, its condition, basic goals, and prospects for development are discussed.
Author

N75-12490 Joint Publications Research Service, Arlington, Va.
METHODS OF CALCULATING THE VARIATIONS IN THE TOTAL FLUX OF RADIANT ENERGY FOR PURPOSES OF LONG RANGE FORECASTING OF LARGE SCALE METEOROLOGICAL FIELDS
G. I. Marchuk and Sh. A. Musayelyan *In its* Meteorology and Hydrol., No. 8, 1974 (JPRS-63560) 29 Nov. 1974 p 10-18 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 8, 1974 p 10-16 (For availability see N75-12488 03-47)

The method of parameterization of the total radiation flux for long range weather forecasting is discussed.
Author

N75-12491 Joint Publications Research Service, Arlington, Va.
METHOD OF INTEGRATING THE SPECTRAL EQUATIONS OF THE PLANETARY DYNAMICS OF THE ATMOSPHERE
c48
V. A. Yefimov *In its* Meteorology and Hydrol., No. 8, 1974 (JPRS-63560) 29 Nov. 1974 p 19-33 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 8, 1974 p 17-28 (For availability see N75-12488 03-47)

The basic principles of realizing the spectral method of solution for purposes of simulating the atmospheric circulation by long-term integration of the equations of planetary dynamics are discussed.
Author

N75-12492 Joint Publications Research Service, Arlington, Va.
OPTIMAL TIME ASSIMULATION OF SATELLITE MEASUREMENT DATA FOR STATISTICAL ANALYSIS OF METEOROLOGICAL FIELDS
O. M. Pokrovskiy *In its* Meteorology and Hydrol., No. 8, 1974 (JPRS-63560) 29 Nov. 1974 p 34-43 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 8, 1974 p 29-36 (For availability see N75-12488 03-47)

A method has been developed for interpreting satellite measurement data. This method, which takes into account the time-space stochastic structure of the meteorological field, makes it possible optimally to assimilate the continuously incoming satellite data. Here the estimate of the values of the meteorological element at the given point in time depends not only on the results of the current indirect measurements but also the preceding measurements. The indicated fact distinguishes the given approach from the existing interpretation methods.
Author

N75-12493 Joint Publications Research Service, Arlington, Va.
RELATION OF THE WIND AND BARIC FIELDS IN THE STRATOSPHERE AND THE LOWER MESOSPHERE OF THE TROPICAL ZONE OF THE NORTHERN HEMISPHERE
c46
L. S. Minyushina *In its* Meteorology and Hydrol., No. 8, 1974 (JPRS-63560) 29 Nov. 1974 p 44-54 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 8, 1974 p 37-45 (For availability see N75-12488 03-47)

On the basis of analyzing the space and time sections of the zonal wind field and the baric topographic maps of the 10 millibar and 2 millibar surfaces a study was made of the problem of the relation of the wind and baric fields in the stratosphere of the tropical zone of the Northern Hemisphere. A comparison was made of the viability of the baric field in the region of quasibiannual and semiannual circulation cycles.
Author

N75-12494 Joint Publications Research Service, Arlington, Va.
ATMOSPHERIC PROCESSES IN THE 30-60 km LAYER IN 1971 - 1973
c48
I. V. Bugayeva and L. A. Ryazanova *In its* Meteorology and

Hydrol., No. 8, 1974 (JPRS-63560) 29 Nov. 1974 p 55-66 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 8, 1974 p 46-55 (For availability see N75-12488 03-47)

According to the data from the rocket sounding stations in the Northern Hemisphere the weekly high altitude baric maps were constructed for the 35, 40, 45, 50, 55, and 60 km levels. During the period from August 1971 to December 1973 such maps were used when studying the processes in the upper stratosphere and lower mesosphere during the spring and fall rearrangements and also during the winter anomalous warmings. It is demonstrated that the time of the spring rearrangements of the meteorological fields in the stratosphere depend both on the phase of the quasibiannual cyclicity and on the nature of the processes of winter anomalous warmings. Author

N75-12495 Joint Publications Research Service, Arlington, Va.
STATISTICAL CHARACTERISTICS OF THE VERTICAL MOISTURE PROFILE IN THE CASE OF CUMULUS CLOUDS c46
N. P. Tverskaya *In its* Meteorology and Hydrol., No. 8, 1974 (JPRS-63560) 29 Nov. 1974 p 67-78 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 8, 1974 p 56-64 (For availability see N75-12488 03-47)

On the basis of the data of aircraft sounding of the atmosphere in the presence of cumulus clouds, the average profiles of the specific humidity and the mean square deviations were obtained for a different quantity and vertical thickness of the clouds. The autocorrelation matrices, the eigenvalues, and eigenvectors were calculated. An analysis was performed and a comparison made of the characteristics obtained for the clear sky and cloudy days. The degree of stability of the statistical characteristics of the humidity was estimated for various gradations of the quantity and thickness of the clouds. Author

N75-12496 Joint Publications Research Service, Arlington, Va.
PROCEDURE FOR FIVE-DAY FORECASTING OF SIGNIFICANT AND WEAK PRECIPITATION IN THE TERRITORY OF NORTHERN KAZAKHSTAN IN MAY - JULY
G. K. Turulina *In its* Meteorology and Hydrol., No. 8, 1974 (JPRS-63560) 29 Nov. 1974 p 79-87 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 8, 1974 p 65-70 (For availability see N75-12488 03-47)

A study was made of the circulation conditions of the formation of significant and weak precipitation. A statistical method is discussed for 5-day forecasting of the amount of precipitation for these cases using the 72 hour hydrodynamic forecasts of the H500 field. The results obtained can be used to calculate the expected precipitation in the spring-summer period in Northern Kazakhstan. Author

N75-12497 Joint Publications Research Service, Arlington, Va.
COMPARISON OF THE DIAGNOSTIC AND FORECASTING CALCULATIONS OF CURRENTS IN THE LOWER PART OF THE ATLANTIC OCEAN c48
V. F. Ivanov and A. S. Sarkisyan *In its* Meteorology and Hydrol., No. 8, 1974 (JPRS-63560) 29 Nov. 1974 p 88-99 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 8, 1974 p 71-79 (For availability see N75-12488 03-47)

A solution is presented to the problem of calculating the density and current fields of the southern part of the Atlantic Ocean. The results are compared with the calculations of the currents with respect to the the given density field. In the surface layers of the ocean these fields agree well among each other and with the observation data. In the deep layers the errors (in the calculations and observations) and, consequently, the divergence between them are large. Author

N75-12498 Joint Publications Research Service, Arlington, Va.
EFFECT OF BOTTOM RELIEF ON THE GEOSTROPHIC WIND CURRENTS c46
L. V. Moskalenko *In its* Meteorology and Hydrol., No. 8, 1974 (JPRS-63560) 29 Nov. 1974 p 100-109 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 8, 1974 p 80-87 (For availability see N75-12488 03-47)

In estimating the effect of the bottom relief on the geostrophic wind circulation, the method of total currents is used. On the basis of calculations of the circulation by the numerical method it was demonstrated that the bottom slopes can lead to displacement of the centers of wind circulation in the zonal and meridional directions and cause intensification of the currents on the shore. The topographic effect is commensurate with the beta effect. Author

N75-12499 Joint Publications Research Service, Arlington, Va.
EMPIRICAL MODEL OF THE ROOT SYSTEM OF WINTER WHEAT CONSIDERING WEATHER CONDITIONS AND THE SOIL MOISTURE DISTRIBUTION BY LAYERS c51
A. R. Konstantinov, L. V. Shcherbak, and L. G. Rudenko *In its* Meteorology and Hydrol., No. 8, 1974 (JPRS-63560) 29 Nov. 1974 p 110-120 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 8, 1974 p 88-94 (For availability see N75-12488 03-47)

The depth of penetration of the root system of winter wheat into the soil was analyzed as a function of the climatic conditions, soil moisture and specific weight of the soil. The analysis was made by the remainder method using graphical regressions. The growth rate of the root system during different interphase periods and the vertical distribution of the root mass were estimated as a function of the mean moisture and its vertical distribution. As a result, a model of the root system was created which makes it possible to calculate its mass and the dept of penetration into the soil by interphase periods. Author

N75-12500 Joint Publications Research Service, Arlington, Va.
SOME CHARACTERISTICS OF THE VERTICAL STRUCTURE OF TROPOSPHERIC CURRENTS IN THE TROPICAL REGIONS OF THE EAST ATLANTIC c46
N. A. Zavelskaya *In its* Meteorology and Hydrol., No. 8, 1974 (JPRS-63560) 29 Nov. 1974 p 121-126 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 8, 1974 p 96-99 (For availability see N75-12488 03-47)

A calculation was made of the divergence of the wind vector in the meridional section through the tropical zone of the Atlantic from 25 deg north latitude to 15 deg south latitude by the data from aerological radiosounding on 16-25 June 1972 on the Musson and the Passat scientific research ships following parallel courses along 19 and 26 deg west longitude. The characteristic values of the divergence and possible ordered vertical velocities are presented. A study was made of the relation between the divergence and the weather. Author

N75-12501 Joint Publications Research Service, Arlington, Va.
ANALYSIS OF TWO CASES OF SIGNIFICANT PRECIPITATION OBSERVED IN THE FOOTHILLS OF NORTHERN TYAN'-SHAN'
S. A. Sultanbayev *In its* Meteorology and Hydrol., No. 8, 1974 (JPRS-63560) 29 Nov. 1974 p 127-132 Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 8, 1974 p 100-102 (For availability see N75-12488 03-47)

A study was made of the causes of the falling of intense shower precipitation in the foothill zone of the northern parts of Kirgizia and the role of orography in the formation of this precipitation. The parameters of the precipitation with their values obtained by the pluviographic data calculated by the formulas are compared. Author

N75-12502 Joint Publications Research Service, Arlington, Va.
BASIC GOALS AND SOME RESULTS OF THE SOVIET NATIONAL EXPEDITION TROPEX-72 (6 JUNE - 19 SEPTEMBER 1972) c46
M. A. Petrosyants *In its* Meteorology and Hydrol., No. 8, 1974 (JPRS-63560) 29 Nov. 1974 p 133-146 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 8, 1974 p 103-110 (For availability see N75-12488 03-47)

A brief discussion is included of the goals, the composition and the structural schematic of the Soviet national expedition TROPEX-72 in June-September 1972 in the eastern part of the tropical Atlantic in preparation for the GARP Atlantic Tropical Experiment. Some results of analyzing the observations performed during the course of the expedition are presented. Author

N75-12503 Joint Publications Research Service, Arlington, Va.
INSTRUMENT FOR MEASURING THE CONCENTRATION OF CRYSTALLINE PARTICLES c35
A. G. Laktionov and N. K. Nikiforova *In its* Meteorology and

Hydrol., No. 8, 1974 (JPRS-63560) 29 Nov. 1974 p 147-153 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 8, 1974 p 111-113 (For availability see N75-12488 03-47)

A polarization photoelectric device is described with a scattering angle of 90 degrees and optical formation of the operating volume. The instrument measures the concentration of the crystal particles 5-500 microns in size in mixed and crystalline fogs with an error not exceeding 20 percent. Author

N75-12504 Joint Publications Research Service, Arlington, Va.
METHOD OF MEASURING AREAS BY A CURVOMETER c43

A. P. Kopylov *In its* Meteorology and Hydrol., No. 8, 1974 (JPRS-63560) 29 Nov. 1974 p 153-155 Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 8, 1974 p 114-115 (For availability see N75-12488 03-47)

A procedure is proposed for measuring areas by a curvometer. A procedure is recommended for taking the measurements and a comparative estimate is made of the accuracy of measuring areas by this procedure. Author

N75-12505 Joint Publications Research Service, Arlington, Va.
SIMPLIFIED METHOD OF MEASURING THE LENGTH OF HIGHLY SINUOUS RIVERS c42

A. P. Kopylov *In its* Meteorology and Hydrol., No. 8, 1974 (JPRS-63560) 29 Nov. 1974 p 156-158 Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 8, 1974 p 115-116 (For availability see N75-12488 03-47)

A simplified procedure is proposed for measuring the length of highly sinuous rivers inadmissible for measurement by means of the KS curvometer. Instead of measuring by the microdividers and selecting the sinuosity coefficient by visual comparison by samples, it is proposed that the length of the zone of twisting be measured by a curvometer, and the twist coefficient be determined analytically directly for a specific river by which the element of subjectivity is excluded. Author

N75-12506 Joint Publications Research Service, Arlington, Va.
TURBULENT DIFFUSION IN THE ENVIRONMENT c46

M. Ye. Berlyand *In its* Meteorology and Hydrol., No. 8, 1974 (JPRS-63560) 29 Nov. 1974 p 159-176 ref Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 8, 1974 p 117-118 (For availability see N75-12488 03-47)

A brief review is given of the recently published book by the Canadian scientist G. Csanady entitled Turbulent Diffusion in the Environment. One of the distinguishing features of the book is the fact that in it the theory of propagation of impurities from local sources both in the atmosphere and in bodies of water is discussed from a united point of view. This is essentially one of the first efforts in world literature to investigate the two basic components of the external environment, air and water, simultaneously. The reviewer concludes that the reviewed monograph will make a significant contribution to the generalization of the results of the studies of turbulent diffusion. A.L.

N75-12507# Joint Publications Research Service, Arlington, Va.
METEOROLOGY AND HYDROLOGY, NO. 9, 1974

2 Dec. 1974 183 p refs Transl. into ENGLISH of Meteorol. Gidrol. (Moscow), no. 9, 1974 128 p (JPRS-63569) Avail: NTIS HC $7.00

Articles are presented on microclimate, agricultural meteorology, weather forecasting, and climate control, hydrological forecasting the activities and personnel of the Soviet Hydrometeorological Service. For individual titles, see N75-12508 through N75-12527.

N75-12508 Joint Publications Research Service, Arlington, Va.
FUTURE CLIMATE

M. I. Budyko *In its* Meteorology and Hydrol., No. 9, 1974 (JPRS-63569) 2 Dec. 1974 p 1-17 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 9, 1974 p 3-15 (For availability see N75-12507 03-47)

A study was made of the effect of anthropogenic factors on the climatic conditions of future decades. The conclusion is drawn of the possibility of significant changes in climate by the end of the 20th Century as a result of the economic activity of man. Author

N75-12509 Joint Publications Research Service, Arlington, Va.
COMPLEX STUDIES OF THE STRATOSPHERIC AEROSOL c46

K. Ya. Kondratyev, L. S. Ivlev, and G. A. Nikolskiy *In its* Meteorology and Hydrol., No. 9, 1974 (JPRS-63569) 2 Dec. 1974 p 18-32 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 9, 1974 p 16-26 (For availability see N75-12507 03-47)

A survey was made of the experimental works to study the vertical concentration profile, microstructure and composition of stratospheric aerosol. The effect of the aerosol on the radiation regime of the stratosphere was investigated. The results of complex studies of the stratospheric aerosol performed at Leningrad University are discussed. Conclusions are drawn regarding the space-time variations of the structure of the stratospheric aerosol, the optical properties of the aerosol and their effect on the radiation regime of the atmosphere and the system made up of the underlying surface and the atmosphere and also the necessity for expansion of the complex studies of the stratospheric aerosol, in particular, its optical properties. Author

N75-12510 Joint Publications Research Service, Arlington, Va.
PROBLEM OF USING ASYNCHRONOUS METEOROLOGICAL DATA

A. L. Chubukova *In its* Meteorology and Hydrol., No. 9, 1974 (JPRS-63569) 2 Dec. 1974 p 33-40 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 9, 1974 p 27-33 (For availability see N75-12507 03-47)

Research was conducted of some statistical characteristics related to the simplest model generating Rossby waves. In particular, the region of definition of the time-space cross-correlation function was found in which its positive determinacy is guaranteed. Author

N75-12511 Joint Publications Research Service, Arlington, Va.
NEW VERSION OF THE PROGRAM FOR OPERATIVE OBJECTIVE ANALYSIS OF THE GEOPOTENTIAL OF ISOBARIC SURFACES c48

A. K. Artanova *In its* Meteorology and Hydrol., No. 9, 1974 (JPRS-63569) 2 Dec. 1974 p 41-49 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 9, 1974 p 34-40 (For availability see N75-12507 03-47)

The operative program for objective analysis of the geopotential fields used on the large computer at the U.S.S.R. Hydrometeorological Center has been presented for the first time as a library of modules. The special organizing algorithm for the program in accordance with the assignment makes up the specific composition of the modules and organizes their modular operation. As a result of optimizing the program algorithms, in spite of expansion of them, a time gain of 18 percent has been obtained. The new program structure offers a possibility of further development. Author

N75-12512 Joint Publications Research Service, Arlington, Va.
CAUSES OF THE EXPLOSIVE ONSET AND LIMITS OF PROPAGATION OF THE SUMMER MONSOON IN THE INDIAN OCEAN

R. F. Burlutskiy *In its* Meteorology and Hydrol., No. 9, 1974 (JPRS-63569) 2 Dec. 1974 p 50-61 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 9, 1974 p 41-50 (For availability see N75-12507 03-47)

On the basis of the observations of the marine Soviet-Indian expedition, Musson-1973 (Monsoon-1973), and the mean climatologic data it is demonstrated that a number of characteristic features of the Indian monsoon are explained by interaction of the macroscale currents with Tibet. Author

N75-12513 Joint Publications Research Service, Arlington, Va.
STRUCTURE AND MIGRATION OF THE EQUATORIAL ZONE OF WEST WINDS IN THE EASTERN HEMISPHERE

Ye. K. Semenov *In its* Meteorology and Hydrol., No. 9, 1974 (JPRS-63569) 2 Dec. 1974 p 62-71 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 9, 1974 p 51-59 (For availability see N75-12507 03-47)

On the basis of the broad aeroclimatic data, a series of meridional and zonal sections of the zonal wind component in the lower and middle troposphere (to the 200 millibar surface) of the tropical zone of the Eastern Hemisphere (for January,

April, July and October) were constructed. The laws of the annual migration of the equatorial zone of west winds are discussed, and the yearround existence of stable westerly transfer in the lower troposphere near the equator is noted. The peculiarities of the structure of the equatorial zone of west winds are indicated, data are presented on its meridional extent, its vertical thickness and the speed of the zonal wind over different regions in the Eastern Hemisphere. The problems of the relation of the equatorial zone of west winds to the east winds in the upper troposphere and the westerly transfer of the temperate latitudes are discussed briefly. Author

N75-12514 Joint Publications Research Service, Arlington, Va.
STUDY OF THE HEAT BALANCE IN THE BOUNDARY LAYER OF THE ATMOSPHERE ACCORDING TO EXPERIMENTAL DATA c46

L. A. Klyuchnikova, N. A. Lazareva, and L. R. Orlenko *In its* Meteorology and Hydrol., No. 9, 1974 (JPRS-63569) 2 Dec. 1974 p 72-81 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 9, 1974 p 60-66 (For availability see N75-12507 03-47)

The results of studying the heat balance on the basis of the heat flow equation integrated with respect to altitude are discussed. In the analysis the material from the expeditionary observations made in connection with the CENEX program was used. The profile is presented for the turbulent heat flux calculated as the remainder term from the heat flux equation. Author

N75-12515 Joint Publications Research Service, Arlington, Va.
RATE OF FORMATION AND DISSIPATION OF SMOG IN OPEN INDUSTRIAL QUARRIES

L. G. Kachurin *In its* Meteorology and Hydrol., No. 9, 1974 (JPRS-63569) 2 Dec. 1974 p 82-91 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 9, 1974 p 67-74 (For availability see N75-12507 03-47)

An analysis was made of the process of the occurrence and dissipation of severe pollution in open industrial quarries. A system of approximate differential equations is proposed which permits calculation of the variation of the wind-temperature stratification of the atmosphere in the quarry on a computer by the magnitude of the variation with time of the wind velocity and temperature in the ground layer of the atmosphere and by the variation of the wind-temperature stratification of the atmosphere, the vertical transfer of the impurities. The method is also applicable for cases of artificial ventilation of quarries. As an example the smog in the Koraka Quarry was used. Quantitative characteristics of the smog transformation process in the quarry satisfactorily agreeing with the observations in deep quarries were obtained. Author

N75-12516 Joint Publications Research Service, Arlington, Va.
TOTAL HEAT TRANSFER TO THE ATMOSPHERE FROM THE OCEAN SURFACE IN THE VICINITY OF FORMATION OF HURRICANE HILDA c46

N. T. Glinskiy and L. A. Kolesnikova *In its* Meteorology and Hydrol., No. 9 1974 (JPRS-63569) 2 Dec. 1974 p 92-98 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 9, 1974 p 75-97 (For availability see N75-12507 03-47)

A study was made of the variation of the turbulent flux of the latent heat of condensation and the turbulent heat transfer to the atmosphere from the ocean surface and also the variation of realization of the latent heat of condensation in the 1000-850 millibar layer in 10 days (from 21 to 30 September) before the formation of Hurricane Hilda (1 October) in the vicinity of the Caribbean Sea. It was established that these values increased by about an order during the period from the quiet state of the atmosphere (21 September) to the occurrence of the tropical storm (30 September). Author

N75-12517 Joint Publications Research Service, Arlington, Va.
APPLICATION OF EXPANSIONS WITH RESPECT TO NATURAL ORTHOGONAL COMPONENTS IN THE STUDIES OF DRAINAGE c43

L. L. Vilkauskas and G. I. Shatkauskas *In its* Meteorology and Hydrol., No. 9, 1974 (JPRS-63569) 2 Dec. 1974 p 99-109 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 9, 1974 p 80-87 (For availability see N75-12507 03-47)

In constructing the mathematical expectation of the process of the effect of hydrometeorological factors on drainage during the period of the spring floods it is proposed that the natural orthogonal components be used which combine condensation of the correlated input parameters by separating the primary components with regression analysis. A study was made of fragments of the spring floods from drainage under various meteorological, anthropogenic and other conditions. Equations were obtained for the relation. Author

N75-12518 Joint Publications Research Service, Arlington, Va.
AUTOMATED REMOTE MEASURING SYSTEM IN AGRO-METEOROLOGY

V. A. Kovalenko, A. D. Kleshchenko, and O. V. Virchenko *In its* Meteorology and Hydrol., No. 9, 1974 (JPRS-63569) 2 Dec. 1974 p 110-116 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 9, 1974 p 93-97 (For availability see N75-12507 03-47)

An automated data gathering and processing system for aerophotometric investigations of the planted fields of farm crops was studied. A functional diagram is presented and its operation is described. A brief description is given for the individual assemblies of the system and the set of programmed moduli for processing the incoming information. Author

N75-12519 Joint Publications Research Service, Arlington, Va.
FLOOD CONTROL LAWS USING ONE AND TWO RESERVOIRS WITH AN EXPONENTIAL TYPE HYDROGRAPH c43

L. G. Rabukhin *In its* Meteorology and Hydrol., No. 9, 1974 (JPRS-63569) 2 Dec. 1974 p 117-120 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 9, 1974 p 98-100 (For availability see N75-12507 03-47)

The process of flood transformation was studied with a hydrograph. By the results of calculations performed on a computer, the relation has been established for the flood transformation coefficient as a function of the regulated capacity of the reservoir, the hydrograph shape coefficient, the maximum flow rate and the duration of the flow. In the presence on one stream of two successively arranged structures the greatest transformation coefficient of the flood is obtained for a flow time from the first to the second structure equal to the flood rise time. Author

N75-12520 Joint Publications Research Service, Arlington, Va.
PROBLEM OF THE METHOD OF DETERMINING THE COMPOSITION OF BOTTOM DEPOSITS AND SUSPENSIONS c43

S. M. Antsyferov, E. L. Onishchenko, and T. F. Makarova *In its* Meteorology and Hydrol., No. 9 1974 (JPRS-63569) 2 Dec. 1974 p 121-126 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 9, 1974 p 100-103 (For availability see N75-12507 03-47)

The sources of schematic errors in determining the fall velocity by a specific sedimentation method are indicated. On the basis of the experiment an estimate was made of their magnitude. Author

N75-12521 Joint Publications Research Service, Arlington, Va.
TECHNOGENIC-GLACIAL MUD AND ROCK FLOW IN THE KHIBIN MOUNTAIN MASS c43

B. N. Rzhevskiy and V. A. Samoylov *In its* Meteorology and Hydrol., No. 9, 1974 (JPRS-63569) 2 Dec. 1974 p 127-133 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 9, 1974 p 88-92 (For availability see N75-12507 03-47)

Results are presented from a geomorphological investigation of the unique collapse of a large amount of caved-in rock in the Khibin mountain mass and also the parameters of the phenomenon. The possible genesis of the mud and rock flow is proposed. Author

N75-12522 Joint Publications Research Service, Arlington, Va.
CALCULATING THE DEPTH OF THE FREEZING OF SWAMPS OF THE FLAT BOG TYPE IN THE EXAMPLE OF THE TARMAN BOG c43

I. M. Romanova *In its* Meteorology and Hydrol., No. 9, 1974 (JPRS-63569) 2 Dec. 1974 p 134-138 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 9, 1974 p 103-106 (For availability see N75-12507 03-47)

A discussion is presented of the method of calculating the depth of freezing of bogs for different microlandscapes. Considering mean negative temperature of the air and the depth and density of the snow, an analysis was made and conclusions were drawn regarding the possibility of using the known values of the depth of freezing of one of the microlandscapes for the investigated microlandscape. Author

N75-12523 Joint Publications Research Service, Arlington, Va.
ACCURACY OF MEASURING THE AMOUNT OF PRECIPITATION BY A SINGLE-WAVE RADAR
L. G. Kononenko and V. M. Muchnik *In its* Meteorology and Hydrol., No. 9, 1974 (JPRS-63569) 2 Dec. 1974 p 139-145 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 9, 1974 p 107-110 (For availability see N75-12507 03-47)

An estimate was made of the accuracy of measuring the amount of precipitation by radar with a wavelength of 3 cm and with corrections from precipitation meters. The correction by one or two precipitation meters at distances to 50 km from the radar in areas of several thousands of square kilometers gives a 20% increase in accuracy. For smaller areas the correction with respect to one precipitation meter also leads to an increase in measurement accuracy. For a range above 50 km in large areas the correction by several precipitation meters does not lead to an increase in accuracy of measuring the precipitation. Author

N75-12524 Joint Publications Research Service, Arlington, Va.
LONG RANGE WEATHER FORECASTING IN JAPAN
V. A. Steblyanko *In its* Meteorology and Hydrol., No. 9, 1974 (JPRS-63569) 2 Dec. 1974 p 146-152 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 9, 1974 p 111-114 (For availability see N75-12507 03-47)

A brief survey is presented of the studies of long range weather forecasts made by the Japanese Meteorological Service in 1963-1968 and generalized in the Handbook on Seasonal Weather Forecasting in Japan. Author

N75-12525 Joint Publications Research Service, Arlington, Va.
LAKES OF MONGOLIA **c43**
M. K. Gavriolva, V. L. Sukhodrovskiy, and G. F. Gravis *In its* Meteorology and Hydrol., No. 9, Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 9, 1974 p 115-116 (For availability see N75-12507 03-47)

This monograph, published in 1971, is the first large generalizing work on the lakes of the Mongolian People's Republic. The book contains five chapters in which a large circle of limnologic problems are investigated from geographic points of view. Author

N75-12526 Joint Publications Research Service, Arlington, Va.
CONTINENTAL HYDROLOGY. TERMS AND DEFINITIONS. GOST 19179-73 **c43**
V. S. Marakhovskiy *In its* Meteorology and Hydrol., No. 9, 1974 (JPRS-63569) 2 Dec. 1974 p 155-156 Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 9, 1974 p 116 (For availability see N75-12507 03-47)

The Izdatel'stvo Standartov has published a new state standard which defines terms and definitions of basic concepts in the field of continental hydrology applied in science, engineering, and production. This normative-technical document was developed by the State Hydrologic Institute and the All-Union Scientific Research Institute of Technical Information, Classification and Coding. Author

N75-12527 Joint Publications Research Service, Arlington, Va.
WEATHER FORECAST AND FORECAST OF THE AGROMETEOROLOGICAL CONDITIONS FOR THE FALL OF 1974 (26 AUGUST TO 15 OCTOBER)
A. M. Aleshina and T. A. Maksimenkova *In its* Meteorology and Hydrol., No. 9, 1974 (JPRS-63569) 2 Dec. 1974 p 175-178 Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 9, 1974 p 125-126 (For availability see N75-12507 03-47)

The analysis of the development of synoptic processes in the space of the Northern Hemisphere has permitted determination that the fall season in the current year will last from 26 August to 15 October. On the average during the season over the greater part of the territory of the U.S.S.R. air temperature and precipitation near normal are expected. The fall is the most important period for agricultural production. During this period it is forecast that in the majority of the regions of the European part of the U.S.S.R. the conditions for gathering potatoes and other late crops are expected to be satisfactory. The cessation of vegetation of the winter crops will take place at times close to usual since the air temperature is expected to be about normal. Author

N75-12528# Research Inst. of National Defence, Stockholm (Sweden).
ON THE FORM OF SPECTRA OF RADAR ECHOES FROM PRECIPITATION [OM FORMEN AV SPEKTRA HOS RADAREKON FRAN NEDERBOERD]
V. A. Kapitanov, J. V. Melnichuk, and A. A. Chernikov Feb. 1973 21 p refs Transl. into SWEDISH from Fiz. Atmosferi i Okeana, no. 9/72 In SWEDISH
(FOA-P-C-8351-M7) Avail: NTIS HC $3.25

A study of 3.2 cm radar echo spectra in light rain and snowfall demonstrated that the spectrum form at small elevation angles exactly follows a Gaussian curve within an interval of spectral density from maximum to approximately the -30 db level. Continued reduction down to -40 db level does not follow below the power law f to the -6 power, where f stands for frequency. At levels below -40 db the spectrum diverges considerably from the Gaussian curve. Collisions between reflecting particles are shown to affect spectral density at low levels. Other possible factors include: (1) fluctuations in the turbulence rates of the circulating particles; (2) vibrations of the drops; (3) oscillation of snowflakes; and (4) changes in the number of circulating particles in the illuminated volume. Author

N75-12529*# Colorado State Univ., Fort Collins. Dept. of Civil Engineering and Atmospheric Sciences.
AN ASSESSMENT OF WARM FOG: NUCLEATION, CONTROL, AND RECOMMENDED RESEARCH Final Report
M. L. Corrin, J. R. Connell, and A. J. Gero Nov. 1974 145 p refs
(Contract NAS8-29583)
(NASA-CR-2477; M-134) Avail: NTIS HC $5.75 CSCL 04B

A state-of-the-art survey is given of warm fog research which has been performed up to, and including, 1974. Topics covered are nucleation, growth, coalescence, fog structures and visibility, effects of surface films, drop size spectrum, optical properties, instrumentation, liquid water content, condensation nuclei. Included is a summary of all reported fog modification experiments. Additional data is provided on air flow, turbulence, a summary of recommendations on instruments to be developed for determining turbulence, air flow, etc., as well as recommendations of various fog research tasks which should be performed for a better understanding of fog microphysics. Author

N75-12530# Research Inst. of National Defence, Sundbyberg (Sweden).
COMPUTER TREATMENT OF CLIMATIC RESEARCH DATA: TABLE TYPE A [DATAMASKINELL BEARBETNING AV KLIMATOLOGISKAFOERSOEKSDATA: TABELL TYP A]
Staffan Loef and Ingemar Widegren Feb. 1973 27 p Partly in SWEDISH and partly in ENGLISH
(FOA-1-C-1503-M4(H5-H6)) Avail: NTIS HC $3.75

A program is reported for selection, statistical treatment and tabulation of data stored with the program INKLIMAT described in FOA1 report C1457. The program makes use of data from each individual and of the defined groups of experimental personnel. Tables are written for every desired criterion of the recordings obtained from the experimental personnel during the maximum four days. Different average values, standard deviations, the t-values and their significance, are also included in the tables. Author

N75-12531*# Texas A&M Univ., College Station. Center for Applied Geosciences.
REDUCTION AND ERROR ANALYSIS OF THE AVE 2 PILOT EXPERIMENT DATA
Henry E. Fuelberg Oct. 1974 142 p refs
(Contract NAS8-26751)

(NASA-CR-120496) Avail: NTIS HC $5.75 CSCL 04A

The reduction techniques used to process data from the pilot experiment of the second NASA atmospheric variability experiment (AVE IIP), which was conducted during a 24 hour period beginning at 1200 GMT on May 11, 1974, and ending at 1200 GMT on May 12, 1974 are described. Each step of the data handling process is described through the presentation of computer flow charts, programs, equations, and narrative. An error analysis of the final output is presented, and results of the AVE IIP reduction process are compared with results from the National Weather Service. The AVE IIP sounding data contain more detail than National Weather Service data, but the two data sets may be used together without difficulty. Author

N75-12532# Kernforschungszentrum, Karlsruhe (West Germany).
ON-LINE DATA ACQUISITION AND DATA PROCESSING IN A METEOROLOGICAL TOWER-PDP-8/1-CALAS SYSTEM COUPLING

F. Suess and P. Thomas Feb. 1974 29 p refs In GERMAN (KFK-1934) Avail: AEC Depository Libraries HC $4.50

The hardware and software configuration for acquisition and processing of meteorological data measured at the Karlsruhe Nuclear Research Center is described. A PDP-8/1 installed near the place of measurement reduces the data collected which are transferred to a TR 86 and subsequently stored on magnetic tape and disc. Both computers are coupled through the CALAS 69/4 operating system offering to the user on-line data acquisition and real-time data evaluation through multiprocessing and time sharing. Author (NSA)

N75-12533# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
PROBLEM OF ANALYTICAL SOLUTION OF EQUATIONS OF DYNAMICS FOR THE MODEL OF AN EQUIVALENT BAROTROPIC LEVEL OF THE ATMOSPHERE

V. A. Snegerev 5 Aug. 1974 17 p refs Transl. into ENGLISH from Tr. Gidrometeorol. Nauch.-Issled. Tsentr. SSSR (USSR), no. 104, 1972 p 21-31

(AD-785106; FTD-HC-23-2095-74) Avail: NTIS CSCL 04/2

Spectral methods for solving equations of atmospheric dynamics are discussed. The possibility is considered of an analytical solution for the equations of dynamics in spectral form of lower order for a complex model of the atmosphere. The frequencies of the time harmonics of the atmospheric models are compared, and various mathematical derivations are presented. N.R.

N75-12534# Dugway Proving Ground, Utah.
FOG AND WIND REGIMES OF THE EUREKA-ARCATA COASTAL REGION OF NORTHERN CALIFORNIA Final Report

Carl A. Bower, Jr. and Edward C. Rengers May 1974 149 p refs

(DA Proj. 1T0-62111-A-128)

(AD-785531; DPG-FR-M600P) Avail: NTIS CSCL 04/2

Data representative of a maritime region with a high frequency of fog were compiled from a number of studies conducted in the Eureka-Arcata coastal region of California. This compilation is presented as background material for operational planning purposes for activities operating in this highly foggy region. General topics addressing the Eureka-Arcata region are: (1) A general description of the physiography, climatology, and oceanography; (2) offshore wind and fog climatology; (3) onshore climatological information on fog-occurrence wind, and visibility; (4) computer simulation of wind fields and trajectories during low visibility conditions; and (5) physical characteriscs of coastal fogs. (Modified author abstract) GRA

N75-12535# Naval Academy, Annapolis, Md. Dept. of Environmental Sciences.
THE NONLINEAR GROWTH OF HURRICANES THROUGH CISK

H. E. Willoughby 10 Apr. 1974 26 p refs

(AD-782662/1; ES-3) Avail: NTIS HC $3.75 CSCL 04/2

A simple, analytic model of the non-linear intensification of hurricanes through Conditional Instability of the Second Kind (CISK) is presented. The model predicts that the time required for a tropical cyclone to reach a specified fraction of its ultimate intensity will be inversely proportional to the ultimate wind speed if the conditions in the sea and atmosphere surrounding the storm remain constant in time. Within the framework of the model, a characteristic time required for a tropical cyclone to transform itself from a weak tropical depression into a hurricane is 35 hours. Although this time is shorter than that obtained in most earlier studies, it agrees with the observed average behavior of seventeen storms from the 1969, 1970, and 1971 Atlantic hurricane seasons. Author (GRA)

N75-12536# Arizona Univ., Tucson. Coll. of Earth Sciences.
RECONSTRUCTION OF PAST CLIMATIC VARIABILITY Semiannual Technical Report, 1 Jan. - 30 Jun. 1974

Harold C. Fritts 30 Jun. 1974 48 p refs

(Grant AF-AFOSR-2406-72)

(AD-785395; AFOSR-74-1424TR; SATR-4) Avail: NTIS CSCL 04/2

Past climatic variations are reconstructed by applying multivariate techniques to well-dated proxy series of climate such as tree rings. Progress is reported on three areas of research: (1) the development and expansion of a tree-ring and climatic data base, (2) experimentation on multivariate methods for modeling climatic parameters as a function of tree growth, and (3) reconstruction of past variations in climate, using tree rings. GRA

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N75-12537*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
THE INFLUENCE OF SURFACE WAVES ON WATER CIRCULATION IN A MID-ATLANTIC CONTINENTAL SHELF REGION

Charles H. Whitlock and Theodore A. Talay Washington Dec. 1974 47 p refs

(NASA-TN-D-7771; L-9699) Avail: NTIS HC $3.75 CSCL 08C

The importance of wave-induced currents in different weather conditions and water depths (18.3 m and 36.6 m) is assessed in a mid-Atlantic continental-shelf region. A review of general circulation conditions is conducted. Factors which perturb the general circulation are examined using analytic techniques and limited experimental data. Actual wind and wave statistics for the region are examined. Relative magnitudes of the various currents are compared on a frequency of annual occurrence basis. Results indicated that wave-induced currents are often the same order of magnitude as other currents in the region and become more important at higher wind and wave conditions. Wind-wave and ocean-swell characteristics are among those parameters which must be monitored for the analytical computation of continental-shelf circulation. Author

N75-12538# Royal Inst. of Tech., Stockholm (Sweden).
MATHEMATICAL MODEL DESCRIBING THE INFLUENCE OF BIOLOGICAL AND PHYSICAL PROCESSES ON THE BIOLOGICAL CONDITIONS IN A SEA [MATEMATISK MODELL BESKRIVANDE BIOLOGISKA OCH FYSIKALISKA PROCESSERS INVERKAN PA DET BIOLOGISKA TILLSTANDET I EN SJOE]

Thomas Kaijser [1972] 44 p ref In SWEDISH, ENGLISH summary

(PT-1972:5) Avail: NTIS HC $3.75

A mathematical model was developed which describes how different biological and physical processes affect biological conditions in a sea. Six condition variables were selected: (1) auto-strophiole (growth centres); (2) hetero-strophiole (consumers); (3) phosphates; (4) nitrates; (5) dirt-organic material; and (6) sedimented material. The processes studied were: (1) photosynthesis, (2) consumption; (3) the process of death; (4) sedimentation; (5) the mixing of water, (6) the supplies; and (7) the outgoings. By analyzing the effects of these processes on the different condition variables a system of differential equations of non linear type was obtained. Author

N75-12539# Danish Meteorological Inst., Copenhagen.
OCEANOGRAPHICAL OBSERVATIONS FROM DANISH LIGHT-VESSELS AND COASTAL STATIONS, 1973 [OCEANOGRAFISKE OBSERVATIONER FRA DANSKE FYRSKIBE OG KYSTSTATIONER, 1973]
1974 134 p Partly in ENGLISH and partly in DANISH
(ISBN-87-7478-097-2) Avail: NTIS HC $5.75

Data on water currents, water temperature and salinity, and surface sample characteristics, taken from oceanographical observations made at the Danish light vessel stations, are recorded in tabular form. A.A.D.

N75-12540# Scripps Institution of Oceanography, La Jolla, Calif. Advanced Ocean Engineering Lab.
MARINE PHYSICS: INTERNAL-SURFACE WAVE INTERACTION Technical Progress Report, 1 Jan. - 30 Jun. 1974
Charles S. Cox, Michael C. Gregg, James L. Cairns, Gordon O. Williams, and Frank H. Champagne 30 Jun. 1974 23 p refs
(Contract N00014-69-A-0200-6039; NR Proj. 260-105)
(AD-785262; AOEL-62; SIO-Ref-74-28) Avail: NTIS CSCL 08/3

This report reflects the technical status of internal/surface wave interaction and microstructure projects conducted within the Advanced Ocean Engineering Laboratory at the Scripps Institution of Oceanography. These projects are: (1) Thermal Microstructure - to examine in detail the structure and dynamics of temperature and salinity and (2) Atmospheric Boundary Layer - to provide an understanding of the interaction between atmospheric boundary effects and surface waves. Author (GRA)

N75-12541# Environmental Prediction Research Facility (Navy), Monterey, Calif.
COMPUTATION OF REAL-TIME CURRENTS OFF SOUTHERN CALIFORNIA WITH MULTI-LAYER HYDRODYNAMICAL-NUMERICAL MODELS
T. Laevastu and G. D. Hamilton Jul. 1974 75 p refs
(AD-785245; ENVPREDRSCHF-Tech-Paper-1) Avail: NTIS CSCL 08/3

The measurement of currents at various levels in deep water is a difficult and expensive task, and the few available measurements do not allow the construction of a coherent picture of these currents. The available general circulation models have not yet reproduced the general circulation in the desired detail and they are unable to reproduce real-time (synoptic) currents. The only method for computation of real-time currents in the ocean, including wind and tidal currents, is by the use of the Hansen type Multi-Layer Hydrodynamical-Numerical Models. (Modified author abstract) GRA

N75-12542# Massachusetts Inst. of Tech., Cambridge. Dept. of Meteorology.
NEW ENGLAND CONTINENTAL SHELF DYNAMICS PILOT EXPERIMENT
Robert C. Beardsley and Bradford Butman Aug. 1974 63 p refs Prepared in cooperation with Woods Hole Oceanographic Institution, Mass.
(Contract N00014-67-A-0204-0048; Grants NSF GA-41075; NSF GA-30729X)
(AD-785257; GFD-74-2) Avail: NTIS CSCL 08/3

Current and sea level observations made on the New England continental shelf during several winter storms show that these short intense wind events dominate the circulation over the shelf, and account for most of the observed net flow. The observations show that large mass transports westward along the shelf were produced by strong westerly wind stresses, while an easterly stress produced little along-shore flow. Significant cross-shelf and along-shelf surface pressure gradients occur during the storms. A simple conceptual model is proposed to explain the observations. The following engineering and scientific aspects of the experiment are also presented: (a) mooring design; (b) field operations; (c) results of hydrographic and suspended sediment surveys; (d) force balances; and (e) spatial analysis of the observed current, sea level and meteorological variables. Author (GRA)

N75-12543# Woods Hole Oceanographic Institution, Mass.
ADVANCED MARINE TECHNOLOGY Technical Progress Report, 1 Aug. 1973 - 31 Jan. 1974
Earl E. Hays, Robert D. Ballard, Frederick R. Hess, William M. Marquet, and Marvin J. McCamis May 1974 51 p refs
(Contract N00014-71-C-0284; ARPA Order 293-008)
(AD-784420; WHOI-74-27) Avail: NTIS CSCL 13/10

A progress report is made for the period 1 August 1973 - 31 January 1974 on the following projects in Advanced Marine Technology: (a) Submerged Navigation, (b) Hydraulic Impact Hammer, (c) Self Contained Ancillary Modular Platform, (d) Modular Acoustic System, and (e) Wide Area Illumination. Author (GRA)

N75-12497 Joint Publications Research Service, Arlington, Va.
COMPARISON OF THE DIAGNOSTIC AND FORECASTING CALCULATIONS OF CURRENTS IN THE LOWER PART OF THE ATLANTIC OCEAN
V. F. Ivanov and A. S. Sarkisyan *In its* Meteorology and Hydrol. No. 8, 1974 (JPRS-63560) 29 Nov. 1974 p 88-99 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 8, 1974 p 71-79 (For availability see N75-12488 03-47)

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N75-12544*# State Univ. of New York, Buffalo. Dept. of Biology.
RADAR STUDIES OF BIRD MIGRATION Final Report, 1 Aug. 1970 - 31 Aug. 1974
Timothy C. Williams and James M. Williams 30 Nov. 1974 38 p refs
(Grant NGR-33-183-003)
(NASA-CR-139802) Avail: NTIS HC $3.75 CSCL 06C

Observations of bird migration with NASA radars were made at Wallops Island, Va. Simultaneous observations were made at a number of radar sites in the North Atlantic Ocean in an effort to discover what happened to those birds that were observed leaving the coast of North America headed toward Bermuda, the Caribbean and South America. Transatlantic migration, utilizing observations from a large number of radars is discussed. Detailed studies of bird movements at Wallops Island are presented. Author

N75-12545# Research Inst. of National Defence, Sundbyberg (Sweden).
A SYSTEM OF COMPUTER PROGRAMS FOR RECORDING THE ACTIVITY OF MICE [SMIL - ETT SYSTEM AV DATORPROGRAM FOER REGISTRERING AV MUSAKTIVITET]
Anders Hasselrot Oct. 1972 29 p refs In SWEDISH
(FOA-1-C-1478-M4) Avail: NTIS HC $3.75

Program and data organization are described recording mice activity in a wheel by the FOA computer PDP 8/1 time sharing system TIROS. The program consists of three units: The proper data collecting program and two associated supporting programs. The latter are concerned with specifying the trail parameters and for comparison of recorded data. The basis, in the form of exact data structure on magnetic tape, allows for the development of more advanced ways of calculating, particularly with a view to statistical treatment. Author

N75-12546*# Alabama Univ., Huntsville.
DETERMINATION OF POINTS OF ENTRY FOR POTENTIAL CONTAMINANTS INTO LIMESTONE AQUIFERS USING THERMAL INFRARED IMAGERY Interim Report
F. L. Doyle 31 Oct. 1974 19 p refs
(Contract NAS8-30216)
(NASA-CR-120540) Avail: NTIS HC $3.25 CSCL 08I

Lineations were identified involving the application of ERTS imagery to geologic and hydrologic problems. Interpretation of the southwest Madison County area is discussed. The tracing of the Beech Grove lineament to the northern boundary of Madison County, Alabama raises the question of its relationship to the trend of lineations in southwestern Madison County. The use of thermography as an indication of soil moisture is reviewed. The effect of soil moisture on surface temperature and the relationship between soil moisture and ground water are examined. J.A.M.

N75-12547# Clemson Univ., S.C.
MATHEMATICAL MODELING OF DONNAN DIALYSIS; A CONTINUOUS ION EXCHANGE MEMBRANE PROCESS Annual Progress Report
S. S. Melsheimer 31 May 1974 28 p refs
(Contract AT(38-1)-810)
(SRO-810-1) Avail: NTIS HC $3.75

The mathematical model of Donnan dialysis was extended to include series mass transfer resistances located in the feed channel boundary layer and in the membrane. In order to separate the feed channel and membrane resistances, continuous flow stirred cell experiments were used to independently determine the membrane counterion mass transfer coefficient. The feed channel counterion mass transfer coefficient, along with the coion leakage coefficient and the solvent permeability constant, was determined from operating data on a parallel channel counterflow dialyzer. Insufficient data have been analyzed to permit correlation of these parameters or evaluation of the adequacy of the two resistance model. Preliminary results do indicate that the model is tractible, yielding reasonably consistent parameter values with moderate computation time. The model is programmed in Fortran. Author (NSA)

N75-12548# Brandeis Univ., Waltham, Mass.
MOLECULAR BASIS FOR THE MUTAGENIC AND LETHAL EFFECTS OF ULTRAVIOLET IRRADIATION Progress Report, 4 Oct. 1973 - 29 May 1974
L. Grossman 29 May 1974 11 p refs
(Contract AT(11-1)-3232)
(COO-3232-3) Avail: NTIS HC $3.25

Progress is reported on the following research projects: isolation of endonucleases specific for UV-irradiated DNA from Micrococcus luteus and Escherichia coli; biological assay for in vitro repair of DNA; reinsertion of nucleotides into DNA strands; and biochemical repair of UV-irradiated Bacillus subtilis transforming DNA. NSA

N75-12549# Brandeis Univ., Waltham, Mass.
EFFECT OF LIGHT ON RESPIRATION AND DEVELOPMENT OF PHOTOSYNTHETIC CELLS Progress Report, 1 Sep. 1973 - 31 Aug. 1974
M. Gibbs 1974 24 p refs
(Contract AT(11-1)-3231)
(COO-3231-2) Avail: NTIS HC $3.25

The distribution of H2 photoevolution was surveyed in a variety of marine and fresh water algae. Strains including representatives of all major algal groups, sustained H2 photoevolution was observed only in Scenedesmus obliquus and Chlamydomonas reinhardi. The multicellular, marine red algae produced H2 but light was not a factor. The effect of the photosynthetic inhibitors dibromothymoquinone and disalicyldenepropanediamine were studied. The results indicate that H2 may be evolved under the influence of light either from water or a reduced carbon compound. A new enzyme, nonreversible, D-glyceraldehyde-3-P dehydrogenase associated with TPN was recently characterized. This enzyme coupled to photosynthesis in an intact spinach chloroplast has been used to characterize the transportation of substrates across the double membrane. The factors affecting elimination of glyceraldehyde-3-P such as phosphate, concentration of CO2, and rate of photosynthesis have been evaluated. NSA

N75-12550# Lovelace Foundation for Medical Education and Research, Albuquerque, N.Mex.
THE TOLERANCE OF BIRDS TO AIRBLAST Final Report
Edward G. Damon, Donald R. Richmond, E. Royce Fletcher, and Robert K. Jones 23 Jul. 1974 38 p refs
(Contract DASA01-70-C-0075)
(AD-785259; DNA-3314F) Avail: NTIS CSCL 06/3

The response of birds to airblast was studied. The direct blast (overpressure) effects in quail, chickens, two-week-old chickens, and geese were determined by placing them at the end of a closed shock tube. Pigeons in-flight were subjected to blast from 64-lb charges. The criteria for direct-blast effects, based on the peak pressures, were no injuries, 5 psi; injuries, 10 psi; and 50-percent mortality, 20 psi. Blast-displacement effects were evaluated by translating quail, chickens, and pigeons from the end of a shock tube. The criteria for blast displacements, based on dynamic-pressure impulse, were no injuries, 5 psi.msec and injuries, 10 psi.msec. Curves relating these criteria as a function of charge weight and ground range were presented. Author (GRA)

N75-12499 Joint Publications Research Service, Arlington, Va.
EMPIRICAL MODEL OF THE ROOT SYSTEM OF WINTER WHEAT CONSIDERING WEATHER CONDITIONS AND THE SOIL MOISTURE DISTRIBUTION BY LAYERS
A. R. Konstantinov, L. V. Shcherbak, and L. G. Rudenko *In its* Meteorology and Hydrol., No. 8, 1974 (JPRS-63560) 29 Nov. 1974 p 110-120 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 8, 1974 p 88-94 (For availability see N75-12488 03-47)

N75-12554 Joint Publications Research Service, Arlington, Va.
CONCEPT OF THE CHARACTERISTIC TIME OF BIOLOGICAL PROCESSES AND ITS APPLICATION FOR STUDYING THE DYNAMICS OF GAS EXCHANGE
V. K. Vasilyev, N. K. Lukyanov, and A. B. Savvin *In its* Space Biol. and Aerospace Med., Vol. 8, No. 5, 1974 (JPRS-63603) 6 Dec. 1974 p 15-24 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8, no. 5, 1974 p 12-17 (For availability see N75-12552 03-52)

N75-12555 Joint Publications Research Service, Arlington, Va.
CHANGES IN PHYSIOLOGICAL FUNCTIONS OF MONKEYS IN A REDUCED GRAVITATION STAND
G. S. Belkaniya, A. N. Razumeyev, and B. A. Lapin *In its* Space Biol. and Aerospace Med., Vol. 8, No. 5, 1974 (JPRS-63603) 6 Dec. 1974 p 24-35 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8, no. 5, 1974 p 17-27 (For availability see N75-12552 03-52)

N75-12556 Joint Publications Research Service, Arlington, Va.
MORPHOCYTOCHEMICAL REACTION OF THE SUPRARENALS AND THYMIC-LYMPHATIC SYSTEM OF RATS AFTER TERMINATION OF HYPOKINESIA
G. P. Tikhonov and Yu. P. Bizin *In its* Space Biol. and Aerospace Med., Vol. 8, No. 5, 1974 (JPRS-63603) 6 Dec. 1974 p 36-40 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8, no. 5, 1974 p 27-30 (For availability see N75-12552 03-52)

N75-12557 Joint Publications Research Service, Arlington, Va.
PECULIARITIES IN THE FORMATION OF CATARACTS IN MICE AFTER IRRADIATION BY 645 MeV PROTONS AND Co60 GAMMA RAYS
A. N. Kabachenko *In its* Space Biol. and Aerospace Med., Vol. 8, No. 5, 1974 (JPRS-63603) 6 Dec. 1974 p 41-48 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8, no. 5, 1974 p 31-35 (For availability see N75-12552 03-52)

N75-12558 Joint Publications Research Service, Arlington, Va.
CONTENT OF GLYCOGEN AND GLUCOSO-6-PHOSPHATASE ACTIVITY IN THE TISSUES OF RABBITS AFTER PROLONGED EXPOSURE TO THE INCREASED PRESSURE OF A HELIUM-OXYGEN ATMOSPHERE
L. G. Ogorodnikova *In its* Space Biol. and Aerospace Med., Vol. 8, No. 5, 1974 (JPRS-63603) 6 Dec. 1974 p 49-55 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8, no. 5, 1974 p 35-39 (For availability see N75-12552 03-52)

N75-12559 Joint Publications Research Service, Arlington, Va.
ACTIVITY OF BLOOD ENZYMES IN RABBITS EXPOSED TO HIGH-MOUNTAIN HYPOXIA
V. M. Varvashtyan and A. A. Altymyshev *In its* Space Biol. and Aerospace Med., Vol. 8, No. 5, 1974 (JPRS-63603) 6 Dec. 1974 p 56-58 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8, no. 5, 1974 p 39-41 (For availability see N75-12552 03-52)

N75-12560 Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF THE DYNAMICS OF ACCUMULATION OF TRACE ELEMENTS BY CHLORELLA CELLS DURING PROLONGED CULTIVATION
Ye. I. Pokrovskaya, G. I. Meleshko, V. N. Zhurenko, L. A. Filatkina,

and L. B. Zhukova *In its* Space Biol. and Aerospace Med., Vol. 8, No. 5, 1974 (JPRS-63603) 6 Dec. 1974 p 59-67 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8, no. 5, 1974 p 41-47 (For availability see N75-12552 03-52)

N75-12568 Joint Publications Research Service, Arlington, Va.
CHAMBER FOR DECOMPRESSING THE CAUDAL PART OF THE ANIMAL BODY

V. G. Voloshin and V. A. Sichkar *In its* Space Biol. and Aerospace Med., Vol. 8, No. 5, 1974 (JPRS-63603) 6 Dec. 1974 p 121-123 Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8, no. 5, 1974 p 81-82 (For availability see N75-12552 03-52)

52 AEROSPACE MEDICINE

Includes physiological factors, biological effects of radiation; and weightlessness.

N75-12551# Technische Universitaet, Hanover (West Germany).
THE MOBILITY OF THE HUMAN ARM: MOTION ANALYSIS AND POSSIBILITIES OF A SIMPLIFIED KINEMATICAL PROSTHETIC SYSTEM Ph.D. Thesis [DIE BEWEGLICHKEIT DES MENSCHLICHEN ARMES BEWEGUNGSANALYSE UND MOEGLICHKEITEN EINES VEREINFACHTEN KINEMATISCHEN ERSATZSYSTEMS]

Ghassan Tutungi 1973 145 p refs In GERMAN
Avail: NTIS HC $5.75

A bionic motion analysis on a healthy human arm is used to determine the positioning of swivel joints in a prosthetic device for armless man. Transl. by G.G.

N75-12552# Joint Publications Research Service, Arlington, Va.
SPACE BIOLOGY AND AEROSPACE MEDICINE, VOLUME 8, NO. 5, 1974

6 Dec. 1974 146 p refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8, no. 5, 1974 93 p (JPRS-63603) Avail: NTIS HC $5.75

Man's reactions to space flight stress simulations are studied by observing physiological and psychological indices. For individual titles, see N75-12553 through N75-12571.

N75-12553 Joint Publications Research Service, Arlington, Va.
NEUROPHYSIOLOGICAL ASPECTS OF INTERACTION OF THE VESTIBULAR SYSTEM WITH OTHER BODY SENSORY SYSTEMS

V. S. Raytses *In its* Space Biol. and Aerospace Med., Vol. 8, No. 5, 1974 (JPRS-63603) 6 Dec. 1974 p 1-14 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8, no. 5, 1974 p 3-11 (For availability see N75-12552 03-52)

Electrophysiological investigations of the convergence and interaction of afferent signals entering the vestibular system along various sensory channels are considered. The possible contribution of this interaction to the integral activity of the brain and the spatial orientation of the body is discussed. Author

N75-12554 Joint Publications Research Service, Arlington, Va.
CONCEPT OF THE CHARACTERISTIC TIME OF BIOLOGICAL PROCESSES AND ITS APPLICATION FOR STUDYING THE DYNAMICS OF GAS EXCHANGE c51

V. K. Vasilyev, N. K. Lukyanov, and A. B. Savvin *In its* Space Biol. and Aerospace Med., Vol. 8, No. 5, 1974 (JPRS-63603) 6 Dec. 1974 p 15-24 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8, no. 5, 1974 p 12-17 (For availability see N75-12552 03-52)

Measuring the characteristic time of biological processes as a certain function characterizing the rate of metabolic processes is discussed. A method is described for determining the characteristic time of biological processes based on the stability concept. This method can be used to study and analyze oxygen consumption by man after termination of moderate work. Author

N75-12555 Joint Publications Research Service, Arlington, Va.
CHANGES IN PHYSIOLOGICAL FUNCTIONS OF MONKEYS IN A REDUCED GRAVITATION STAND c51

G. S. Belkaniya, A. N. Razumeyev, and B. A. Lapin *In its* Space Biol. and Aerospace Med., Vol. 8, No. 5, 1974 (JPRS-63603) 6 Dec. 1974 p 24-35 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8, no. 5, 1974 p 17-27 (For availability see N75-12552 03-52)

In experiments on monkeys a study was made of the influence exerted on the principal body functions by prolonged presence in a reduced gravitation stand. It is demonstrated that prolonged presence (up to 26 days) under conditions corresponding to terrestrial gravity leads to a decrease in the support reaction, a lability of the cardiovascular system, a decrease in rectal temperature moderate hyperglycemia, an intensification of the diuretic reaction with a decrease in the sodium content in the blood, characteristic changes in the peripheral blood and suppression of the red component of blood formation in the bone marrow. Changes in the EEG and H-reflex reflect the decrease in excitability of central nervous structures and the neuro-muscular system. Author

N75-12556 Joint Publications Research Service, Arlington, Va.
MORPHOCYTOCHEMICAL REACTION OF THE SUPRARENALS AND THYMIC-LYMPHATIC SYSTEM OF RATS AFTER TERMINATION OF HYPOKINESIA c51

G. P. Tikhonov and Yu. P. Bizin *In its* Space Biol. and Aerospace Med., Vol. 8, No. 5, 1974 (JPRS-63603) 6 Dec. 1974 p 36-40 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8, no. 5, 1974 p 27-30 (For availability see N75-12552 03-52)

On the 20th day of hypokinesia rats exhibited a morphocytochemical rearrangement in the suprarenals and in the thymic-lymphatic system which is typical of the stage of chronic resistance of any stress reaction. After the hypokinetic exposure was terminated structural changes in the mentioned organs of rats exhibited another stressed state of their bodies. Immediately after the experiment the animals were intravenously injected with toxic doses of fluorochlorocarbon. The animals exhibited an increased resistance to the poison which seemed to be associated with a high content of corticosteroids in the blood, the compounds having an anti-inflammatory activity. Author

N75-12557 Joint Publications Research Service, Arlington, Va.
PECULIARITIES IN THE FORMATION OF CATARACTS IN MICE AFTER IRRADIATION BY 645 MeV PROTONS AND Co60 GAMMA RAYS c51

A. N. Kabachenko *In its* Space Biol. and Aerospace Med., Vol. 8, No. 5, 1974 (JPRS-63603) 6 Dec. 1974 p 41-48 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8, no. 5, 1974 p 31-35 (For availability see N75-12552 03-52)

The cataractogenic effect of 645-MeV protons and Co60 gamma rays in doses of 100, 200, 400 and 600 rad was studied. The first changes in the crystalline lens of mice were detected eight to ten weeks after irradiation. The duration of the latent period was inversely proportional to the dose of proton and gamma irradiation. The degree and incidence of cataract development were a function of the dose and the time which had elapsed after irradiation. The clinical picture of cataracts induced by 645-MeV proton irradiation was similar to that of the lenticular opacities induced by other radiations. The relative biological effectiveness of 645-MeV protons was equal to unity, as judged by the incidence of the cataracts induced. Author

N75-12558 Joint Publications Research Service, Arlington, Va.
CONTENT OF GLYCOGEN AND GLUCOSO-6-PHOSPHATASE ACTIVITY IN THE TISSUES OF RABBITS AFTER PROLONGED EXPOSURE TO THE INCREASED PRESSURE OF A HELIUM-OXYGEN ATMOSPHERE c51

L. G. Ogorodnikova *In its* Space Biol. and Aerospace Med., Vol. 8, No. 5, 1974 (JPRS-63603) 6 Dec. 1974 p 49-55 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8, no. 5, 1974 p 35-39 (For availability see N75-12552 03-52)

The content of glycogen in the liver, myocardium and skeletal muscles, as well as the glucoso-6-phosphatase activity of the liver of rabbits were investigated during their 10 day exposure

in a helium-oxygen atmosphere at a pressure of 350 m H2O. The pressure seemed to be the major factor determining biochemical changes in animal tissues. Under these experimental conditions metabolic reactions were different in various tissues different with respect to the type of carbohydrate metabolism and function. Author

N75-12559 Joint Publications Research Service, Arlington, Va.
ACTIVITY OF BLOOD ENZYMES IN RABBITS EXPOSED TO HIGH-MOUNTAIN HYPOXIA **c51**
V. M. Varvashtyan and A. A. Altymyshev *In its* Space Biol. and Aerospace Med., Vol. 8, No. 5, 1974 (JPRS-63603) 6 Dec. 1974 p 56-58 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8, no. 5, 1974 p 39-41 (For availability see N75-12552 03-52)

The activity of amylase, aldolase and glucosophosphate isomerase in the blood serum of rabbits increased during the first 15 days of their exposure to high altitude hypoxis (at an elevation of 3,200 m), then decreased slightly and stabilized at a new level by the 60th day. Prolonged increase in enzymic activity can be attributed to an increase in permeability of cell membranes and a change in the metabolic rate. Author

N75-12560 Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF THE DYNAMICS OF ACCUMULATION OF TRACE ELEMENTS BY CHLORELLA CELLS DURING PROLONGED CULTIVATION **c51**
Ye. I. Pokrovskaya, G. I. Meleshko, V. N. Zhurenko, L. A. Filatkina, and L. B. Zhukova *In its* Space Biol. and Aerospace Med., Vol. 8, No. 5, 1974 (JPRS-63603) 6 Dec. 1974 p 59-67 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8, no. 5, 1974 p 41-47 (For availability see N75-12552 03-52)

The accumulation of trace elements in the medium and the biomass of Chlorella during its 15-day cultivation was studied. The algae were grown in a 16-liter reactor on a recycling nutrient solution with a density of 5 to 7 g matter per liter and a pH = 6 to 7.5. Trace elements were added at a concentration of 2 ml of Arnon mixture and 20 mg of Na EDTA per liter. By the end of the experiment the concentration of iron, copper, manganese, zinc, molybdenum and boron in the medium had increased by a factor of 3-10. It was demonstrated that the accumulation of iron and copper in the mass was linearly related to an increase of these elements in the medium. Author

N75-12561 Joint Publications Research Service, Arlington, Va.
SOME PROBLEMS IN EVALUATING THE VESTIBULAR FUNCTION OF AVIATORS AND COSMONAUTS
K. L. Khilov *In its* Space Biol. and Aerospace Med., Vol. 8, No. 5, 1974 (JPRS-63603) 6 Dec. 1974 p 68-75 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8, no. 5, 1974 p 47-52 (For availability see N75-12552 03-52)

Different tests used in the screening of pilots and cosmonauts are reported. These include simulation of situations which can be encountered in actual flight. Particular attention is given to the role of higher parts of the central nervous system played in the inhibition of vestibular autonomic reactions. New possibilities for preventing motion sickness in pilots and cosmonauts are considered. Author

N75-12562 Joint Publications Research Service, Arlington, Va.
SOME REGULARITIES IN ADAPTATION TO PROLONGED ROTATION
R. R. Galle, M. D. Yemelyanov, L. A. Kitayev-Smyk, and A. M. Klochkov *In its* Space Biol. and Aerospace Med., Vol. 8, No. 5, 1974 (JPRS-63603) 6 Dec. 1974 p 76-87 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8, no. 5, 1974 p 53-60 (For availability see N75-12552 03-52)

One of the most promising methods for generating artificial gravity in order to prevent the unfavorable effect of weightlessness is rotation of a spacecraft. Presented are findings from clinical and physiological examinations of subjects who were exposed to long term rotation at a velocity of 24-36 deg/sec using an apparatus 20 m in diameter. During the first one or two days the subjects developed symptoms of motion sickness, cardiovascular deconditioning, deterioration of functioning of the analyzers and stress reactions. After six to eight days of adaptation the subjects returned to normal with respect to their health, performance and many physiological parameters. An increased vestibular tolerance persisted for two weeks after termination of prolonged (15 to 29 days) rotation. Author

N75-12563 Joint Publications Research Service, Arlington, Va.
FUNCTION OF PERCEPTION OF SPACE COORDINATES DURING VESTIBULAR TRAINED BY ACTIVE, PASSIVE AND COMPLEX METHODS
I. Ya. Yakovleva, B. B. Bokhov, and L. N. Kornilova *In its* Space Biol. and Aerospace Med., Vol. 8, No. 5, 1974 (JPRS-63603) 6 Dec. 1974 p 88-97 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8, no. 5, 1974 p 60-66 (For availability see N75-12552 03-52)

The effect of vestibular training was studied by a passive method (repeated exposures to linear accelerations and Coriolis accelerations), by an active method (physical exercises) and by a combined method (a combination of passive and active methods carried out regularly for 6 to 24 months) on the function of perception of space coordinates. All types of vestibular training improved the accuracy of perception of space coordinates, as was demonstrated by vestibular tests. The passive method with linear accelerations yielded the best results. Author

N75-12564 Joint Publications Research Service, Arlington, Va.
REGIONAL HEMODYNAMICS IN ANTIORTHOSTATIC TESTS OF DIFFERENT INTENSITY
D. A. Alekseyev, Kh. Kh. Yarullin, T. N. Krupina, and T. D. Vasilyeva *In its* Space Biol. and Aerospace Med., Vol. 8, No. 5, 1974 (JPRS-63603) 6 Dec. 1974 p 98-107 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8, no. 5, 1974 p 66-72 (For availability see N75-12552 03-52)

The optimum angle of inclination and duration were determined for the antiorthostatic test best revealing the adaptive possibilities of cerebral and pulmonary vessels to negative postural effects. Using rheography, photo- and rheoplethysmography the state of cerebral, pulmonary and peripheral circulation was simultaneously studied in 12 test subjects during antiorthostatic tests. Three types of regional hemodynamic changes were observed with respect to the level and time of the postural load: slight, moderate and significant. The training effect of repeated antiorthostatic tests for a negative gravity load was noted. Author

N75-12565 Joint Publications Research Service, Arlington, Va.
WEARING OF ANTI-G SUIT BY PERSONS WITH REDUCED ORTHOSTATIC STABILITY **c54**
V. A. Gornago, Yu. D. Pometov, B. F. Asyamolov, V. S. Panchenko, and B. S. Katkovskiy *In its* Space Biol. and Aerospace Med., Vol. 8, No. 5, 1974 (JPRS-63603) 6 Dec. 1974 p 108-112 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8, no. 5, 1974 p 73-75 (For availability see N75-12552 03-52)

Four test subjects exhibited a significantly lowered orthostatic stability as a result of a 30-day exposure to an antiorthostatic position. Then the subjects donned an anti-g suit by means of which lower body positive pressure was provided. The effect of lower body positive pressure on gas exchange and hemodynamics was studied. During a test with the subjects all wearing a suit and in an erect position they exhibited a decreased heart rate and respiratory minute volume and an increased minute volume of respiration, oxygen pulse and CO2 concentration in the alveolar gas. It is concluded that the orthostatic stability of man can be increased by means of lower body positive pressure. Author

N75-12566 Joint Publications Research Service, Arlington, Va.
EFFECT OF 30-DAY HYPOKINESIA ON THE DYNAMICS OF HIGHER NERVOUS ACTIVITY AND SLEEP OF AN OPERATOR
V. N. Artishuk, A. N. Litsov, V. P. Stupnitskiy, and Yu. V. Yakushkov *In its* Space Biol. and Aerospace Med., Vol. 8, No. 5, 1974 (JPRS-63603) 6 Dec. 1974 p 113-117 Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8, no. 5, 1974 p 75-79 (For availability see N75-12552 03-52)

Operators exhibited three main periods during a 30-day bedrest experiment: (1) the first period was characterized by adequate reactions to exposures, good mood, excellent performance and sound sleep at night; (2) the second period was

characterized by instability of mood, inadequate reactions to the changing environment, indications of group incompatability, worsened performance and poor sleep at night; and (3) the third period was characterized by increased psychic activity, reduced number of complaints about poor health and fatigue, stabilization of performance and an insignificant improvement of night sleep. Physical exercises and electric stimulation of the muscles during bedrest and rehabilitation periods exerted a positive effect on the dynamics of higher nervous activity of the test subjects. Author

N75-12567 Joint Publications Research Service, Arlington, Va.
OPTIMIZATION OF TIME VARIABLE THICKNESS OF RADIATION PROTECTION AGAINST SOLAR FLARE PROTONS
V. A. Sakovich *In its* Space Biol. and Aerospace Med., Vol. 8, No. 5, 1974 (JPRS-63603) 6 Dec. 1974 p 118-120 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8, no. 5, 1974 p 79-80 (For availability see N75-12552 03-52)

The stochastic nature of solar flare protons is analyzed in relation to radiation danger during space flights and the creation of optimal shielding for manned spaceships. The dosage of solar flare protons behind the shielding is computed on the basis of the assumption that all protons are characterized by some averaged spectrum, the risks derivative for shielding thickness, and the duration of man's presence in the various spacecraft compartments. G.G.

N75-12568 Joint Publications Research Service, Arlington, Va.
CHAMBER FOR DECOMPRESSING THE CAUDAL PART OF THE ANIMAL BODY **c51**
V. G. Voloshin and V. A. Sichkar *In its* Space Biol. and Aerospace Med., Vol. 8, No. 5, 1974 (JPRS-63603) 6 Dec. 1974 p 121-123 Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8, no. 5, 1974 p 81-82 (For availability see N75-12552 03-52)

A decompression chamber for the lower part of an animal is designed that encorporates a slide carrier, connecting wall pieces for the introduction of measuring instruments, and a diaphragm for sealing the entrance window and ensuring rarefaction volume in the test chamber. G.G.

N75-12569 Joint Publications Research Service, Arlington, Va.
RESPIRATORY ACTIVITY SENSOR USING CONDUCTING PAPER **c54**
N. A. Karnaukhova *In its* Space Biol. and Aerospace Med., Vol. 8, No. 5, 1974 (JPRS-63603) 6 Dec. 1974 p 124-126 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8, no. 5, 1974 p 82-84 (For availability see N75-12552 03-52)

A tensometric•sensor is developed that utilizes a stack of conducting paper held between metal plates to measure the external respiration function. The relationship between sensor resistance and compression force is inversely proportional. Registry of the pneumogram includes a device for transforming the change in chest perimeter during inhalation/exhalation into the compressive force of the sensor for automatic voltage recording. G.G.

N75-12570 Joint Publications Research Service, Arlington, Va.
ECG CHANGES IN THE MX, DS AND MC LEADS IN CASES OF FOCAL AND DIFFUSE DAMAGE TO THE CARDIAC MUSCLE
A. G. Zerenin, V. A. Talavrinov, L. S. Ambatyello, I. M. Grishina, and M. V. Sokolovskaya *In its* Space Biol. and Aerospace Med., Vol. 8, No. 5, 1974 (JPRS-63606) 6 Dec. 1974 p 127-130 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8, no. 5, 1974 p 84-85 (For availability see N75-12552 03-52)

The ECG leads MX, DS, and MC make it possible to determine diffuse changes in the myocardium of ischemic cardiac patients. Focal damage is detected most frequently on the MC leads and in almost half of all investigated cases in the MX and DS leads. Only the DS lead makes a more definite localization of these changes possible. G.G.

N75-12571 Joint Publications Research Service, Arlington, Va.
PHAGOCYTIC ACTIVITY OF HUMAN BLOOD NEUTROPHILS UNDER ORDINARY CONDITIONS OF VITAL FUNCTIONING AND IN AN ISOLATION CHAMBER
M. V. Markaryan *In its* Space Biol. and Aerospace Med., Vol. 8, No. 5, 1974 (JPRS-63603) 6 Dec. 1974 p 131-134 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8, no.5, 1974 p 85-87 (For availability see N75-12552 03-52)

Changes in the phagocytic activity of human blood are connected to seasonal variations of biological reactions. Relatively low indices for the absorptive function of neutrophils are found during November and December, with a statistically reliable increase in stimulation shown during the spring-summer months. G.G.

N75-12572*# Stanford Univ., Calif.
COLLABORATIVE RESEARCH IN CARDIOVASCULAR DYNAMICS AND BONE ELASTICITY Final Report
Oct. 1974 14 p ref
(Grant NGL-05-020-223)
(NASA-CR-140997) Avail: NTIS HC $3.25 CSCL 06P

A collaborative research program covering a variety of topics of biomechanics and biomedical engineering within the fields of cardiovascular dynamics, respiration, bone elasticity and vestibular physiology is described. The goals of the research were to promote: (1) a better understanding of the mechanical behavior of the circulatory system and its control mechanisms; (2) development of noninvasive methods of measuring the changes in the mechanical properties of blood vessels and other cardiovascular parameters in man; (3) application of these noninvasive methods to examine in man the physiological effects of environmental changes, including earth-simulated gravitational changes; and (4) development of in-flight methods for studying the events which lead to post-flight postural hypotension. Author

N75-12573*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
PROTON TISSUE DOSE FOR THE BLOOD FORMING ORGAN IN HUMAN GEOMETRY: ISOTROPIC RADIATION
G. S. Khandelwal and John W. Wilson Washington Dec. 1974 21 p refs
(NASA-TM-X-3089; L-9628) Avail: NTIS HC $3.25 CSCL 06P

A computer program is described which calculates doses averaged within five major segments of the blood forming organ in the human body taking into account selfshielding of the detailed body geometry and nuclear star effects for proton radiation of arbitrary energy spectrum (energy less than 1 GeV) and isotropic angular distribution. The dose calculation includes the first term of an asymptotic series expansion of transport theory which is known to converge rapidly for most points in the human body. The result is always a conservative estimate of dose and is given as physical dose (rad) and dose equivalent (rem). Author

N75-12574*# Naval Aerospace Medical Research Lab., Pensacola, Fla.
CRITERIA FOR PERSONAL DOSIMETRY IN MIXED RADIATION FIELDS IN SPACE
Hermann J. Schaefer 16 Sep. 1974 22 p refs
(NASA Order T-43310-G)
(NASA-CR-140365; NAMRL-1208) Avail: NTIS HC $3.25 CSCL 06R

The complexity of direct reading and passive dosimeters for monitoring radiation is studied to strike the right balance of compromise to simplify the monitoring procedure. Trapped protons, tissue disintegration stars, and neutrons are analyzed. Author

N75-12575# Royal Aircraft Establishment, Farnborough (England).
COMPLEX PSYCHOPHYSIOLOGICAL EVALUATION OF THE READABILITY OF SYMBOLIC INFORMATION
L. D. Chainova, I. A. Komarova, and F. I. Zonabend Oct. 1974 18 p refs Transl. into ENGLISH from Vop. Psikhologii (USSR), v. 16, no. 2, 1970 p 163-168
(RAE-Lib-Trans-1777; BR44130) Avail: NTIS HC $3.25

Slides of conventional cartographic symbols varying in number were exposed for two seconds. Twelve such symbols were selected experimentally to cover the range of difficulty. Recordings were then made on ten subjects of their EEG, GSR, EMG, and electro-oculogram (EOG) in a recognition task in which the number and difficulty of the symbols were varied. The GSR, EOG, and EEG measures were found to reflect the condition of the visual system best. The results obtained make it possible to make decisions regarding information saturation of the visual field, ways of representing symbols, exposure time, and individual differences. Author

N75-12576# Research Inst. of National Defence, Stockholm (Sweden).
RECOVERY TIME AFTER BEING DAZZLED, AS A FUNCTION OF AGE [ATERHAMTNINGSTID EFTER BLAENDNING SOM FUNKTION AV ALDER]
Brian Hogman, Bjoern Tengroth, Jane Thorburn, and Goeran Oernberg Jan. 1973 10 p refs In SWEDISH
(FOA-2-C-2587-E1) Avail: NTIS HC $3.25

The ability of the eye to recover or its readaptation (RAT) after photostress depends on a number of factors such as the light characteristics of the dazzle source, angle of vision, level of adaptation, etc. This capacity of recovery is also influenced by the individual's age. The report deals with RAT studies on different age groups. For this, the opto-kinetic nystagmus (OKN) has been used. OKN has been recorded by EOG technique. The results show that the different age groups differ mainly at low background luminance. Author

N75-12577# Research Inst. of National Defence, Stockholm (Sweden).
DETECTABILITY OF AN UNSHARP EDGE IN ADDITIVE NOISY BACKGROUND
Torleiv Orhaug and Rune Johansson Jan. 1973 37 p refs
(FOA-2-C-2591-E1-H5) Avail: NTIS HC $3.75

The results of perception experiments are reported which were aimed at studying the observer's ability to detect an edge of varying sharpness, intensity and area. The edge was observed against a background of additive, normally distributed noise. The results have been analyzed with allowances for the background noise characteristics and the visual systems characteristics. They can be described by a linear detection model whose characteristics comprise spatial derivation and integration of the visual stimulus pattern. Author

N75-12578# Research Inst. of National Defence, Stockholm (Sweden).
CHANGES IN MASS OF BIOLOGICAL CELLS WHEN IRRADIATED WITH Q-PULSED RUBY LASER [FOERAENDRING AV MASSAN HOS BIOLOGISKA CELLER VID BESTRAELNING MED Q-PULSAD RUBINLASER]
Bengt Rosengren and B. Tengroth Jan. 1973 9 p refs In SWEDISH
(FOA-2-C-2586-E6) Avail: NTIS HC $3.25

The instantaneous changes in mass of colored biological cells when irradiated with a Q-pulsed ruby laser have been studied. The mass change has been measured with the aid of X-ray absorption technique. A mass increase for cells in a surrounding liquid was obtained when irradiated at 6 MW/sq cm. Without the liquid, a reduction in cell mass was measured, with irradiation at 0.9 MW/sq cm. Author

N75-12579# Royal Aircraft Establishment, Farnborough (England).
PROCEDURE FOR THE ISOLATION AND DETERMINATION OF ALDOSTERONE IN HUMAN URINE BY THIN-FILM CHROMATOGRAPHY ON POLYAMIDE AND BTC MICROREACTION
W. Hoelzel and M. Buechner Sep. 1974 8 p refs Transl. into ENGLISH from Acta Biol. Med. German. (East Germany), v. 19, 1967 p 189-192
(RAE-Lib-Trans-1778; BR43708) Avail: NTIS HC $3.25

The procedure was developed to isolate the aldosterone liberated in urine after pH1-hydrolysis, by thin layer chromatography on polyamide, following extraction with chloroform, and to determine it quantitatively with blue tetrazolium chloride (BTC) in solution. The process involves a simple working method and a relatively small expenditure of time, and so seems to offer good prospects for routine investigations. Author

N75-12580*# Kentucky Univ., Lexington. Wenner-Gren Research Lab.
A FEASIBILITY STUDY OF LIMB VOLUME MEASURING SYSTEMS
J. F. Lafferty and W. M. Carter Sep. 1974 56 p refs
(Contract NAS9-12749)
(NASA-CR-140330) Avail: NTIS HC $4.25 CSCL 06P

Evaluation of the various techniques by which limb volume can be measured indicates that the odometric (electromechanical) method and the reflective scanner (optical) have a high probability of meeting the specifications of the LBNP experiments. Both of these methods provide segmental measurements from which the cross sectional area of the limb can be determined. Author

N75-12581# Washington Univ., Seattle.
DETERMINATION OF TOTAL BODY CALCIUM (SKELETAL MASS) IN MAN BY IN VIVO NEUTRON ACTIVATION ANALYSIS AND TOTAL BODY COUNTING Progress Report, 1 Jul. 1973 - 30 Jun. 1974
W. B. Nelp 20 Mar. 1974 47 p refs Prepared in cooperation with Battelle-Northwest, Richland, Wash.
(Contract AT(45-1)-2225)
(TID-26613) Avail: NTIS HC $3.75 CSCL 06P

Bone mass in relation to the therapy of osteporosis was studied. By collecting Ar-37 from exhaled breath following whole-body neutron activation, total body calcium can be determined. Data are available for 33 normal males and females from ages 21 to 80. Instrumentation development is described. NSA

N75-12582# Texas Univ., San Antonio. Health Science Center.
THE CONTROL OF THE CARDIOVASCULAR AND CENTRAL NERVOUS SYSTEM Interim Report, 1 Apr. 1973 - 31 Mar. 1974
Vernon S. Bishop, Kenneth Blum, Arthur H. Briggs, Oliver Carrier, Jr., and Miguel A. Medina 1974 33 p refs
(Grant AF-AFOSR-2074-71; AF Proj. 9777)
(AD-784933; AFOSR-74-1336TR) Avail: NTIS CSCL 06/19

Cardiovascular studies indicated the importance of beat-to-beat regulation of heart rate via the aortic nerve, the importance of the pericardium in minimizing stresses, and following positive acceleration in unprotected subjects acute cardiopulmonary congestion may occur in the post-acceleration period. Thus, subtile changes in adaptive mechanisms are important defensive mechanisms against the stresses employed. Other studies indicate that with a high -G force there is inhibition of ethanol sleep time response but with a low -G force augmentation of sleep time is produced. These may lead to important clues as to the nature of chemical changes and the effects of drugs taking place during acceleration. Studies on the effects of immobilization on muscle function indicate there is increased lysosomal activity which may account for the abnormal contractile function and may lead to important implications in prevention of muscle atrophy during immobilization. (Modified author abstract) GRA

N75-12583# School of Aerospace Medicine, Brooks AFB, Tex.
AIRCRAFT ACCIDENT MEDICAL INVESTIGATOR'S KIT Final Report, 1970 - 1974
Paul J. Sheffield, David A. Davolt, and Robert M. Adams Sep. 1974 35 p refs
(AD-785389; SAM-TR-74-43) Avail: NTIS CSCL 06/12

A prototype kit developed for medical teams engaged in aircraft accident investigation provides all essential items needed: to collect biological samples; to obtain photographic evidence; to record the relative locations of victims and their life support equipment; to record and preserve verbal comments; to communicate by radio between team members; and to maintain the investigator's personal effectiveness. Two prototype kit versions have been used extensively by medical personnel during field training exercises wherein aircraft accident investigation is taught. They have also been used in the investigation of several general aviation accidents. Two identical sets are being evaluated at widely separated Air Force bases, both engaged in large-scale flight training activities. Preliminary reports indicate that a standard

kit would be useful for thorough aircraft investigation by medical personnel. (Modified author abstract) GRA

N75-12584# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
VIBRATION DISEASE AND ITS PATHOGENESIS
E. C. Andreeva-Galanina and N. I. Karpov 21 Aug. 1974 20 p refs Transl. into ENGLISH from Uch. Zap. Nauch. Issled. Inst. Gigieny (Moscow), 1968 p 14-26
(AD-785202; FTD-MT-24-1025-74) Avail: NTIS CSCL 06/19

Pathogenesis of the onset and development of the vibration disease is connected with a complex interacting chain of neurohumoral and reflex-developing changes in the activity of the various regions of the nervous system (peripheral and central). In the advanced stages, vibration can lead to degenerative processes in the nervous system, vascular system, and muscles. The only favorable recommendation is early diagnosis and a rational job placement. GRA

N75-12597 Institute of Aviation Medicine, Fuerstenfeldbruck (West Germany).
TIME DEPENDENCE OF THE FLIGHT INDUCED INCREASE OF FREE URINARY CORTISOL SECRETION IN JET PILOTS
G. Ulbrecht, E. Meier, R. Rothenfusser, and K. V. Werder *In* AGARD Simulation and Study of High Workload Operations Oct. 1974 6 p refs (For availability see N75-12587 03-53)

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N75-12585*# Massachusetts Inst. of Tech., Cambridge.
MODEL OF HUMAN DYNAMIC ORIENTATION Ph.D. Thesis
Charles C. Ormsby 1974 253 p refs
(Grant NGR-22-009-701)
(NASA-CR-132537) Avail: NTIS HC $8.50 CSCL 05J

The dynamics associated with the perception of orientation were modelled for near-threshold and suprathreshold vestibular stimuli. A model of the information available at the peripheral sensors which was consistent with available neurophysiologic data was developed and served as the basis for the models of the perceptual responses. The central processor was assumed to utilize the information from the peripheral sensors in an optimal (minimum mean square error) manner to produce the perceptual estimates of dynamic orientation. This assumption, coupled with the models of sensory information, determined the form of the model for the central processor. The problem of integrating information from the semi-circular canals and the otoliths to predict the perceptual response to motions which stimulated both organs was studied. A model was developed which was shown to be useful in predicting the perceptual response to multi-sensory stimuli. Author

N75-12586# Research Inst. of National Defence, Stockholm (Sweden).
VARIABILITY IN REACTION RESPONSE [REAKTIONSBEREDSKAPENS VARIABILITET]
Hans-Gunnar Helgeson and Rune Johansson Dec. 1972 47 p refs In SWEDISH
(FOA-2-C-2581-H5) Avail: NTIS HC $3.75

An experiment was carried out in which the reactions of test personnel to 8 bright points generated in random order, on a PDP-12-display, were recorded by the use of 8 keys on a teletypewritter. The conditions were: Untrained and rested, untrained and tired, trained and rested, trained and tired. Training reduced the average time of reaction and its spread. Tiredness increased the number of errors. The quality effectiveness was periodic. Reactions close together show positive correlation. The reaction times show an irregular fine oscillation of about 8 to 10 seconds time of oscillation and a coarse oscillation average 4 minutes (which is equivalent to oscillations in attention and more pronounced periods of tiredness respectively). Author

N75-12587# Advisory Group for Aerospace Research and Development, Paris (France).
SIMULATION AND STUDY OF HIGH WORKLOAD OPERATIONS
A. N. Nicholson, ed. (RAF Inst. of Aviation Med.) Oct. 1974 126 p refs Presented at the Aerospace Med. Panel Specialist Meeting, Oslo, 24-25 Apr. 1974
(AGARD-CP-146) Avail: NTIS HC $5.75

The use of simulation for the evaluation of aircrew performance in high operational work load situations is considered. For individual titles, see N75-12588 through N75-12603.

N75-12588 School of Aerospace Medicine, Brooks AFB, Tex.
SYSTEMS SIMULATION: A GLOBAL APPROACH TO AIRCREW WORKLOAD
Harry M. Hughes, Bryce O. Hartman, Raul Garcia, and Paul Lozano *In* AGARD Simulation and Study of High Workload Operations Oct. 1974 14 p (For availability see N75-12587 03-53)

Aircrew workload can be studied at many different levels of detail. In the most general sense, it is a function of the total workload imposed upon a unit in relation to the number of crews in that unit. An airlift system simulation program has been designed using this global approach and a number of simulation studies have been performed. Outcomes in terms of systems effectiveness measures, crew workload, and crew welfare measures will be presented. Author

N75-12589 National Aerospace Lab., Amsterdam (Netherlands).
A SIMULATOR STUDY TO INVESTIGATE HUMAN OPERATOR WORKLOAD
P. H. Wewerinke and J. Smit *In* AGARD Simulation and Study of High Workload Operations Oct. 1974 6 p refs (For availability see N75-12587 03-53)

Human response characteristics in control situations of widely varying difficulty were studied. The experiment was aimed at a better understanding of the human operator limitations in terms of control effort as included in the optimal control model. Based on the experimental results a control effort index is presented. The predicted control effort correlates excellently with subjective ratings and seems to have a useful generality. Author

N75-12590 Royal Aircraft Establishment, Farnborough (England). Human Factors Group.
LABORATORY RESEARCH INTO HUMAN INFORMATION PROCESSING
Jo H. F. Huddleston *In* AGARD Simulation and Study of High Workload Operations Oct. 1974 3 p (For availability see N75-12587 03-53)

Pilot workload can be expressed as the coping with two main clusters of problem. One cluster is equipment based and theoretically amenable to physical modelling, even replacement. The other cluster is emphatically to do with humanity; to do with those elusive personal gambles on which life is felt to depend. Pilot workload might be the maintenance of a mental model encompassing these two kinds of time varying input; the continued provision of a mental solution for two sources of uncertain problem. Respectable transfer function work considers varied inputs, monitor outputs, and debate black box contents with a rare freedom. Author

N75-12591 Royal Air Force Inst. of Aviation Medicine, Farnborough (England).
EVALUATING MEASURES OF WORKLOAD USING A FLIGHT SIMULATOR
J. M. Rolfe, J. W. Chappelow, R. L. Evans, S. J. E. Lindsay, and A. C. Browning (RAE) *In* AGARD Simulation and Study of High Workload Operations Oct. 1974 13 p refs (For availability see N75-12587 03-53)

A flight instrument trainer, resembling a twin jet communications aircraft, was used to evaluate questionnaire, performance and activity analysis measures of pilot workload. Attempts were made to distinguish between the physical, perceptual and mental components of workload. For this purpose three flight plans were devised, of approximately equal duration, differing markedly with respect to the three above components. Six professional pilots flew each flight plan and after landing completed questionnaires to assess the workload levels and the task content.

During the flights video recordings were made of the pilot's manual and communication activity. From the measures it was possible to obtain significantly different results relating to the different flight plans. These results were capable of distinguishing between the three components of workload represented in the flights. Author

N75-12592 Royal Air Force Inst. of Aviation Medicine, Farnborough (England).
A FLIGHT SIMULATOR STUDY OF MISSILE CONTROL PERFORMANCE AS A FUNCTION OF CONCURRENT WORKLOAD
K. G. G. Corkindale *In* AGARD Simulation and Study of High Workload Operations Oct. 1974 6 p refs (For availability see N75-12587 03-53)

Eight pilots took part in a part task simulation of the delivery of a stand-off air-to-surface guided weapon. The attack phase of a sortie was simulated. This phase lasted some 3 minutes and included a low level run to the weapon release area, weapon release, target detection on the TV monitor display and the aiming of the missile at the target. Four levels of workload were studied. The results showed that: (1) performance at the missile control was degraded by increases in concurrent workload; and (2) manual flight control and auto-pilot monitoring were adversely affected by concurrent missile control tasks. Author

N75-12593 Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
SIMULATION OF HIGH WORKLOAD OPERATIONS IN AIR TO AIR COMBAT
F. M. Holden, D. B. Rogers, and C. R. Replogle *In* AGARD Simulation and Study of High Workload Operations Oct. 1974 4 p refs (For availability see N75-12587 03-53)

Workload measurements for the study and analysis of human performance are analyzed to provide effectiveness versus design data with specific examples from air to air combat man-in-the-loop simulations. The report concludes with a discussion of man-in-the-loop simulation as a technique for system specific human performance data and as a source for the data required to develop general methods and techniques for predicting the performance of manned weapon systems. Author

N75-12594 Dunlap and Associates, Inc., la Jolla, Calif.
PILOT LANDING PERFORMANCE UNDER HIGH WORKLOAD CONDITIONS
C. A. Brictson *In* AGARD Simulation and Study of High Workload Operations Oct. 1974 10 p refs (For availability see N75-12587 03-53)

A longitudinal study of pilot carrier landing performance was conducted to describe the influence of prolonged operations on pilot performance. A landing performance criterion previously validated in a fleet environment was used to measure and compare pilot and squadron performance variations over time. Three levels of cumulative workload were defined to evaluate concomitant changes in performance associated with each workload. Pilot landing performance improved over time with more improvement found in night performance than day. The influence of practice on carrier landings is discussed in relation to high cumulative workload. The performance criterion was used to identify potential night pilots on the basis of landing proficiency. High and low proficiency pilots also were identified and diagnostic training information provided. Author

N75-12595 Defence and Civil Inst. of Environmental Medicine, Downsview (Ontario).
AIRCREW WORKLOAD AND HUMAN PERFORMANCE: THE PROBLEM FACING THE OPERATIONAL COMMANDER
W. D. Macnamara *In* AGARD Simulation and Study of High Workload Operations Oct. 1974 5 p refs (For availability see N75-12587 03-53)

The information available to an operational commander on the reliability and serviceability of the human component in the air weapons system is limited when compared to that available for the aircraft and other systems components. The common use of total flying hours does not provide the commander with information consistent with that now available from aircrew workload and performance studies. A basis for and the background in the development of a trail approach to providing commanders with better information on the human component is described. Author

N75-12596 School of Aerospace Medicine, Brooks AFB, Tex. Environmental Physiology Branch.
ENDOCRINE-METABOLIC INDICES OF AIRCREW WORKLOAD: AN ANALYSIS ACROSS STUDIES
Henry B. Hale, Richard C. McNee, James P. Ellis, Jr., Ralph R. Bollinger, and Bryce O. Hartman *In* AGARD Simulation and Study of High Workload Operations Oct. 1974 6 p refs (For availability see N75-12587 03-53)

Endocrine metabolic measures have been subjected to a cross-sectional analysis in an effort to ascertain the basic relation of endocrine metabolic activity to the workload in either actual or simulated flights. For the present purpose, load represents degree of flight difficulty multiplied by duration. Difficulty was based upon USAF expert rankings, and duration was based upon fractions of a day. Multiple linear regression analysis was performed on data for urinary epinephrine, norepinephrine, 17-OHCS, urea, Na, K, and the Na/K ratio. This report presents the findings in the first phase of the cross-sectional study. Author

N75-12597 Institute of Aviation Medicine, Fuerstenfeldbruck (West Germany).
TIME DEPENDENCE OF THE FLIGHT INDUCED INCREASE OF FREE URINARY CORTISOL SECRETION IN JET PILOTS c52
G. Ulbrecht, E. Meier, R. Rothenfusser, and K. V. Werder *In* AGARD Simulation and Study of High Workload Operations Oct. 1974 6 p refs (For availability see N75-12587 03-53)

A modified competitive protein binding assay of free urinary cortisol using a single solvent extraction and a cortisol binding globulin from a dexamethasone suppressed male subject was developed. The separation of bound and free cortisol was performed by adsorption of the free cortisol to dextran coated charcoal. The sensitivity of the method allows to measure as low as 0.2 ng per tube. In seven F-104 pilots flying two missions a day the 24 hr free urinary cortisol secretion was significantly higher compared to 12 pilots on day of rest. When 26 F-104 pilots, 12 RF 4E pilots and 14 weapon system operators (WSO) were evaluated by measuring free urinary cortisol excretion in short intervals it could be demonstrated, that only the pilots flying early in the morning showed an enhancement of adrenocortical activity compared to normal controls, suggesting a change of excitability of the hypothalamo-pituitary-adrenal system during the day. Author

N75-12598 Navy Medical Neuropsychiatric Research Unit, San Diego, Calif.
EMOTIONAL AND BIOCHEMICAL EFFECTS OF HIGH WORK-LOAD
William B. McHugh, Paul Naitoh, and C. A. Brictson (Dunlap and Associates, Inc., La Jolla, Calif.) *In* AGARD Simulation and Study of High Workload Operations Oct. 1974 9 p refs (For availability see N75-12587 03-53)

A preliminary longitudinal multifactorial study of the interrelationships of biochemical, mood, biographical factors and landing performance under high work load conditions has been carried out with U. S. Naval Aviators. Levels of serum cholesterol, serum uric acid, blood lactate, pyruvate, and mood assessments were made during periods of non-flying activity and during periods of increased cumulative work load. Uric acid values fell during moderate cumulative work load, and cholesterol values fell during high cumulative work load. Increased variability of pyruvate and lactate were noted with increased cumulative work load. Increased cumulative work load did not affect emotions or performance but altered mood association patterns and altered the relationships of mood and performance. Experience was correlated with performance under zero cumulative work load conditions. Emotion correlated with performance under high cumulative work load conditions. Author

N75-12599 Dunlap and Associates, Inc., la Jolla, Calif.
PREDICTION OF PILOT PERFORMANCE: BIOCHEMICAL AND SLEEP-MOOD CORRELATES UNDER HIGH WORK-LOAD CONDITIONS

C. A. Brictson, W. B. McHugh (Navy Med. Neuropsychiatric Res. Unit), and P. Naitoh (Navy Med. Neuropsychiatric Res. Unit) *In* AGARD Simulation and Study of High Workload Operations Oct. 1974 10 p refs (For availability see N75-12587 03-53)

A preliminary longitudinal study of the factors affecting the carrier landing performance of naval aviators under high workload conditions has been carried out. Using stepwise multiple regression techniques, a substantial portion of the variability in landing performance could be accounted for by six factors under zero cumulative workload conditions and by seven factors under moderate cumulative workload conditions. High cumulative workload conditions sharply reduced predictive ability. Although specific aircraft experience and total flight experience were important predictors of average landing performance, blood biochemical levels and emotional states had significant predictive ability. Sleep patterns relate strongly to performance. The factors that determine landing performance change as cumulative as workload increases. Author

N75-12600 Royal Air Force Strike Command, High Wycombe (England).

LONG RANGE AIR-TO-AIR REFUELLING: A STUDY OF DUTY AND SLEEP PATTERNS

N. H. Mills and A. N. Nicholson (RAF Inst. of Aviation Med.) *In* AGARD Simulation and Study of High Workload Operations Oct. 1974 9 p refs (For availability see N75-12587 03-53)

The sleep patterns of ground crew, pilots and tanker crews involved in a long range air-to-air refuelling mission have been related to their duty hours. During such complex operations workload may vary considerably and the demands placed on some aircrew may be very high. It is suggested that the duty hours demanded of individual aircrew should be related to their overall workload. In this way it may be possible to maintain an acceptable sleep pattern in all aircrew and ensure that no individual pilot or crew member is subjected to excessive duty hours. Author

N75-12601 Supreme Headquarters Allied Powers Europe (Shape), Casteau (Belgium).

HIGH WORKLOAD TASKS OF AIRCREW IN THE TACTICAL STRIKE, ATTACK AND RECONNAISSANCE ROLES

F. TerBraak *In* AGARD Simulation and Study of High Workload Operations Oct. 1974 3 p (For availability see N75-12587 03-53)

High workload tasks are outlined for aircrew performing three distinct tactical roles, namely the strike, the attack and the reconnaissance roles. The total mission is covered, which is from the time the pilot receives his orders until the debriefing following the flight has been completed. At the same differences between each role, as related to workload, are printed out so that a fairly realistic comparison can be made as to the workload of each category. Author

N75-12602 Royal Air Force, Binbrook (England).

THE AIR DEFENCE ROLE

J. Hutchinson *In* AGARD Simulation and Study of High Workload Operations Oct. 1974 5 p (For availability see N75-12587 03-53)

In considering the workload involved in the air defense role, it is important to be clear as to the dimensions of the subject. On the one hand, any air defense situation will pose a problem which can be defined in absolute mathematical terms, and whose solution implies a certain degree of effort. The essence of air defense is that the intruder will set about making the defender's task as difficult as possible; the tactics he adopts, in addition to making the problem less tractable, may also reduce, through stress, fatigue, fear or several more factors the ability of the air defense crew to solve the problem. The perceived workload facing the crews whose ability is thus impaired may prove to be beyond their capability. Pilots need training against all possible threats from supersonic air launched missiles at high level, through high subsonic bomber penetrations at low level, to air combat manoeuvring against fighter-type aircraft. This range of possibilities includes head-on, beam and rear attacks with missiles, guns or both, pressed home either semi-automatically using electronically computed steering information, or visual information. Author

N75-12603 School of Aerospace Medicine, Brooks AFB, Tex.

PHYSIOLOGICAL COSTS OF EXTENDED AIRBORNE COMMAND AND CONTROL OPERATIONS

Ralph R. Bollinger, Robert D. ODonnell, and Bryce O. Hartman *In* AGARD Simulation and Study of High Workload Operations Oct. 1974 9 p ref (For availability see N75-12587 03-53)

During Exercise Night Star the personnel of the National Emergency Airborne Command Post successfully documented their ability to maintain a continuous airborne alert for an extended period. Biomedical evaluation showed that performance was maintained by the mission teams, flight crews, and ground support personnel. When significant fatigue did occur, whether in flight or on the ground, it developed near the beginning of the exercise. The only cases of marked or persistent fatigue were seen in those groups whose day/night, work/rest cycles were shifted and can be attributed in major part to the resulting sleep loss. However, all groups appeared to adapt to their new work schedules as the exercise progressed. Author

N75-12604*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

EFFECTS OF VARIOUS RUNWAY LIGHTING PARAMETERS UPON THE RELATION BETWEEN RUNWAY VISUAL RANGE AND VISUAL RANGE OF CENTERLINE AND EDGE LIGHTS IN FOG Final Report

Richard F. Haines Dec. 1973 75 p refs
(Contract DOT-FA73WAI-346)
(NASA-TM-X-72112; AD-785320; FAA-RD-73-170) Avail: NTIS HC $4.25 CSCL 01/3

Thirty six students and 54 commercial airline pilots were tested in the fog chamber to determine the effect of runway edge and centerline light intensity and spacing, fog density, ambient luminance level, and lateral and vertical offset distance of the subject from the runway's centerline upon horizontal visual range. These data were obtained to evaluate the adequacy of a balanced lighting system to provide maximum visual range in fog viewing both centerline and runway edge lights. The daytime system was compared against two other candidate lighting systems; the nighttime system was compared against other candidate lighting systems. The second objective was to determine if visual range is affected by lights between the subject and the farthestmost light visible through the fog. The third objective was to determine if college student subjects differ from commercial airline pilots in their horizontal visual range through fog. Two studies were conducted. GRA

N75-12605# Deutsche Gesellschaft fuer Luft- und Raumfahrt, Cologne (West Germany).

NEW OR NEWLY TESTED METHODS FOR THE ASSESSMENT OF PILOTS' WORKLOAD [NEUARTIGE BZW. IN DER ERPROBUNG BEFINDLICHE VERFAHREN ZUR ABSCHAETZUNG DER PILOTENBELASTUNG]

2 May 1974 98 p refs In GERMAN; ENGLISH summary
Proc. of the 14th DGLR Anthropotech. Meeting, Munich, 27 Nov. 1973
(DLR-Mitt-74-19) Avail: NTIS HC $4.75; ZLDI, Munich 22 DM

A quantitative analysis of psychophysical load in performing complex tasks was made. Pulse frequency sinusoidal arrhythmia of pilots and flight control personnel were measured. Results of simulation of a STOL landing for measuring stress in operators were given. A method was devised for evaluating work load in flight security personnel. For individual titles, see N75-12606 through N75-12611.

N75-12606 Technische Universitaet, Munich (West Germany). Inst. fuer Ergonomie.

QUANTITATIVE ANALYSIS OF PSYCHOPHYSICAL STRESS IN OPERATING COMPLEX DYNAMIC SYSTEMS [ZUR QUANTITATIVEN ANALYSE DER PSYCHOPHYSISCHEN BEANSPRUCHUNG BEI DER BEDIENUNG KOMPLEXER DYNAMISCHER SYSTEME]

Heinz Schmidtke *In* DGLR New or Newly Tested Methods for the Assessment of Pilots' Workload 2 May 1974 8 p In GERMAN (For availability see N75-12605 03-53)

The relative value of physiological and psychological factors in determining workload in complex situations is discussed with a view to establishing quantitative methods of analysis. ESRO

N75-12607 Institute of Aviation Medicine, Fuerstenfeldbruck (West Germany).
PSYCHOPHYSIOLOGICAL STRESS INVESTIGATIONS OF AN INSTRUMENT-COORDINATION ANALYZER [PSYCHOPHYSIOLOGISCHE BELATUNGSUNTER- SUCHUNGEN AN EINEM INSTRUMENTEN-KOORDINATIONS-TESTGERAET (ICA)]
K. F. Klein *In* DGLR New or Newly Tested Methods for the Assessment of Pilots' Workload 2 May 1974 10 p In GERMAN (For availability see N75-12605 03-53)

Heart and respiratory rate, skin resistance, and eyelid flickering data were monitored during operation of a pilot selection apparatus allowing complex instrument coordination tasks to find standardized stress-physiological response correlations. Results indicate strong expectation tenseness before tests while, during performance, heart and respiratory rate decrease. Continuous or growing workloads ameliorate heart rate. ESRO

N75-12608 Technische Universitaet, Munich (West Germany). Inst. fuer Arbeitsphysiologie.
HEART RATE AND SINUSOIDAL ARRYTHMIA MEASUREMENT IN VIEW OF OBJECTIVATING CONCENTRATION AND STRESS IN CONTROL TASKS [HERZFREQUENZ- UND SINUSARHYTMIE-MESSUNGEN ZUR FRAGE DER OBJEKTIVIERUNG VON KONZENTRATION UND BEANSPRUCHUNG IN REGELAUFGABEN]
Helmut Strasser *In* DGLR New or Newly Tested Methods for the Assessment of Pilots' Workload 2 May 1974 24 p refs In GERMAN (For availability see N75-12605 03-53)

Mental effort during control tasks such as pursuit tracking tests was correlated with heart rate, low frequency arrhythmia, and high frequency sinus arrhythmia profiles monitored for several hours. Results show that pulse frequency and sinusoidal arrhythmia appear in a somewhat reciprocal relation. Sinus arrhythmia, though varying greatly among individuals, is a reliable parameter which provides supplementary information when test linked factors cease to show up in pulse frequency. ESRO

N75-12609 Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany). Abteilung Anthropotechnik.
MEASUREMENT AND ESTIMATION PROCEDURE FOR FLIGHT SAFETY CONTROL OPERATOR WORKLOAD [VERFAHREN ZUR MESSUNG UND ABSCHAETZUNG DER ARBEITSBELASTUNG AN FLUGSICHERUNGSARBEITSPLAETZEN]
R. Seifert, H. Gollwitzer, K. Brauser, and S. Streubel *In* DGLR New or Newly Tested Methods for the Assessment of Pilots' Workload 2 May 1974 20 p refs In GERMAN (For availability see N75-12605 03-53)

The workload of air traffic control personnel tends to increase rapidly, consequently, an evaluation of workload in specific locations was devised on the basis of operators' tasks, control boards categorization, and parameter choice. Observed radar operators were also subjected to standard interviews for autocriticism and correlation with measured data. Standardized appraisal of different locations in German airports led to an evaluation of mean control capacity in the Federal Republic of Germany. ESRO

N75-12610 Deutsche Gesellschaft fuer Luft- und Raumfahrt, Cologne (West Germany).
ERROR CONTROL IN ESTIMATION OF PILOT STRESS BY MEASURING SKIN RESISTANCE [UEBER VERMEIDBARE FEHLER DER MESSMETHODIK BEIM ABSCHAETZEN DER PILOTENBELASTUNG VERMITTELS ELEKTRISCHER HAUTWIDERSTANDSMESSUNGEN]
Kurt Gratzl *In its* New or Newly Tested Methods for the Assessment of Pilots's Workload 2 May 1974 16 p refs In GERMAN (For availability see N75-12605 03-53)

The choice of electrodes and solvents affecting skin physiology is discussed for skin treatment. The use of gold electrodes and tampons dipped in physiological solution is considered. Skin resistance varies according to dermatome distribution and homerstosis of internal organs projecting on the dermatome. The representation of skin resistance measurements is discussed. ESRO

N75-12611 Institute of Aviation Medicine, Fuerstenfeldbruck (West Germany).
APPLICATION OF HUMAN FACTORS ENGINEERING DATA IN MEDICAL EVALUATION OF FLIGHT CREWS [ANWENDUNG ANTHROPOTECHNISCHER DATEN BEI DER FLUGMEDIZINISCHEN BEURTEILUNG FLIEGENDER BESATZUNGEN]
H. J. Grunhofer *In* DGLR New or Newly Tested Methods for the Assessment of Pilots' Workload 2 May 1974 4 p In GERMAN (For availability see N75-12605 03-53)

To allow correct evaluation of the critical static and dynamic functions of a pilot in the cockpit of his own airplane, a cockpit simulator was constructed allowing exact reproduction of angles and distances from controls and from displays of the most important instruments. The control boards were changed to reproduce exactly the real situation in flight and panels displaced to allow evaluation of freedom of movement also in emergency situations such as ejection of a wounded pilot. ESRO

N75-12612# Wright State Univ., Dayton, Ohio. Dept. of Psychology.
VISUAL INFORMATION PROCESSING OF COMPLEX IMAGERY Final Report, 15 Dec. 1972 - 25 Mar. 1974
Allan Pantle Jul. 1974 130 p refs
(Contract F33615-73-C-4031; AF Proj. 7233)
(AD-785366; AMRL-TR-74-43) Avail: NTIS CSCL 05/10

An analysis of extant literature reveals a large body of experimental evidence supporting the concept that the human visual system performs a two-dimensional harmonic analysis of visual stimuli. It also reveals a smaller body of evidence that seems to contradict this concept. Experiments performed propose a resolution of these apparent contradictions, and show how existing concepts must be slightly modified to include changes in the kind of harmonic analysis performed. Three kinds of analysis, representing increasingly fine spatial-frequency resolution, seem to quantify human performance at many form-perception tasks; the kind of analysis performed depends on the task. A single plot showing the masking effect of one spatial frequency on another promises great utility in target acquisition and detection studies camouflage designs, and designs for optimal man/machine interfaces. (Modified author abstract) GRA

N75-12613# Michigan Univ., Ann Arbor. Human Performance Center.
HUMAN INFORMATION PROCESSING: AN ASSESSMENT AND RESEARCH BATTERY
Andrew Murray Rose Jan. 1974 131 p refs
(Contract F44620-72-C-0019; AF Proj. 9778; AF Proj. 6813)
(AD-785411; TR-46; AFOSR-74-1372TR) Avail: NTIS CSCL 05/10

The paper is concerned with human information processing capacities and limitations. The goal of the effort is the establishment of a test battery that can be used to evaluate performance in a wide variety of situations, and that can provide information concerning basic processing capacities. The basic strategy was to select experimental or research paradigms that have firm theoretical and empirical bases. Selected tasks were adapted to feasible formats and four small-scale experiments were performed to refine the paradigms of selected tasks. A final battery was then assembled, and a large-scale validation experiment was performed. (Modified author abstract) GRA

N75-12614# Illinois Univ., Savoy. Aviation Research Lab.
APPLICATION OF RESPONSE SURFACE METHODOLOGY TO SHAPE DISCRIMINATION
Lawrence A. Scanlan Feb. 1974 45 p refs
(Contract F44620-70-C-0105; AF Proj. 9778)
(AD-785367; ARL-74-2/AFOSR-74-1; AFOSR-74-1445TR)
Avail: NTIS CSCL 09/2

The effects of systematically manipulating five physical features of random, closed figures were determined. Subjects were asked to select one of four figures presented as being least like the others. The five features investigated were: number of edges, area, radial length variance, edge length variance, and orientation of the major axis. A five-factor, five-level, central-composite response surface design was employed. The resulting regression equation indicated that four features were reliable in their prediction of performance. Additionally several interaction

effects were found. The applicability of these data for computer simulation is discussed. Author (GRA)

N75-12615# California Univ., Berkeley. Inst. of Industrial Relations.
INDIVIDUAL DIFFERENCES IN AN ORGANIZATIONAL SETTING: INTERRELATIONSHIPS AND INFLUENCES
Milton R. Blood, Skip Lima, and John R. Kestell Aug. 1974 94 p refs
(Contract N00014-69-A-0200-1054; NR Proj. 177-941)
(AD-785003; TR-7) Avail: NTIS CSCL 05/10

A series of investigations has examined the interrelationships of individual-difference variables in an organizational setting. Work-reward preferences are treated as the focal variables for the studies. A discussion is presented which examines the appropriateness of within-person and between-person prediction models in the motivation domain. Author

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N75-12616* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
ORTHOTIC ARM JOINT Patent
Dan H. Dane, inventor (to NASA) Issued 19 Nov. 1974 7 p Filed 4 Oct. 1973 Supersedes N74-10100 (12 - 01, p 0013)
(NASA-Case-MFS-21611-1; US-Patent-3,849,668; US-Patent-Appl-SN-403694; US-Patent-Class-307-149; US-Patent-Class-214-1CM; US-Patent-Class-308-174) Avail: US Patent Office CSCL 05H

An improved orthopedic (orthotic) arm joint that can be used in various joint of mechanical arms is described. The arm joints includes a worm, which is coupled to an electric motor for rotating a worm gear carried within a rotatable housing. The worm gear is supported on a thrust bearing and the rotatable housing is supported on a radial thrust bearing. A bolt extends through the housing, bearings, and worm gear for securing the device together. A potentiometer extends through the bolt, and is coupled to the rotatable housing for rotating therewith, so as to produce an electrical signal indicating the angular position of the rotatable housing. Official Gazette of the U.S. Patent Office

N75-12617*# Massachusetts Inst. of Tech., Cambridge. Man-Vehicle Lab.
INVESTIGATION OF PILOT'S ROLE AND DISPLAY REQUIREMENTS IN AUTOMATIC LANDINGS Progress Report, 1 Sep. 1973 - 31 Aug. 1974
Renwick E. Curry 31 Aug. 1974 66 p refs
(Grant NGR-22-009-735)
(NASA-CR-140844) Avail: NTIS HC $4.25 CSCL 05H

Two experimental capabilities were developed on the PDP-12 computers. The first of these was an experimental monitor to perform experiments in the psychophysics of visual target motion prediction, discrimination, etc., and exercises the (limited) graphical capabilities of the PDP-12. The original monitor was modified to include the capability of handling more than 64 stimuli without reinitializing the program. The second experimental monitor was programmed and was used to investigate pilot decisions in low visibility approaches. The details of this experimental capability, which has great potential for exploring decisions and behavior, are described in detail. Author

N75-12618*# General Electric Co., Houston, Tex.
QUALIFICATION TEST REPORT BUMP PROTECTION HAT (SUBASSEMBLY OF T020/M509 HEAD PROTECTIVE ASSEMBLY)
D. B. Willis 5 Dec. 1972 39 p
(Contract NAS9-11905)
(NASA-CR-140347; QTR-72-1039) Avail: NTIS HC$3.75 CSCL 06Q

The bump protection hat (BPH) was subjected to impact testing in which it underwent three impacts at 35 foot-pounds of energy. The impacts generated stress cracks, but no penetration. All impacts resulted in deflections of less than one-half inch. It was shown that the BPH is qualified for Skylab and the rescue vehicle. Author

N75-12619# Southwest Research Inst., San Antonio, Tex.
UNITED STATES NAVY PHYSIOLOGICAL TELEMETRY SYSTEM OPERATION AND MAINTENANCE MANUAL Final Report, 10 Nov. 1972 - 12 Sep. 1974
Robert L. Wilbur 12 Sep. 1974 31 p
(Contract N00014-73-C-0206; SwRI Proj. 13-3601)
(AD-785273) Avail: NTIS CSCL 06/2

A single channel, 2 pound, belt worn telemetry system that conveys heart rate and core temperature information up to at least a mile without loss of signal integrity and accuracy is described. The system includes two single channel transmitters (Motorola HT-220 Handie-Talkie), a Receiver Station containing two matching receivers, two office type cassette recorders, and signal conditioning to provide data storage and direct digital readout of core temperature and heart rate on two remotely located test subjects. The Receiver Station is portable, powered by a 12 volt automobile battery and is designed to be operated by field personnel with little or no medical training. (Modified author abstract) GRA

N75-12620# Illinois Univ., Savoy. Aviation Research Lab.
MAN AS A PRECIOUS RESOURCE: THE ENHANCEMENT OF HUMAN EFFECTIVENESS IN AIR TRANSPORT OPERATIONS Interim Report
Stanley N. Roscoe May 1974 25 p refs
(Contract F44620-70-C-0105; AF Proj. 9778)
(AD-785368; ARL-74-6/AFOSR-74-4; AFOSR-74-1446TR) Avail: NTIS CSCL 05/8

All aviation systems of practical interest include both men and machines, and aviation psychology is the scientific study of human behavior in the operation of aviation systems. The enhancement of human effectiveness in flight operations involves the complementary processes of behavioral engineering and the selection and training of personnel. Behavioral engineering refers to the intentional effort to design equipment, organize system elements, and develop operational procedures to maximize system performance while minimizing the need to select and train personnel. Selection and training of flight crews and controllers maximize system performance within limits inherent to the system as designed. Specific research topics are reviewed. (Modified author abstract) GRA

N75-12621*# Army Natick Labs., Mass. Food Lab.
NON-CAKING FREEZE DRIED APPLESAUCE
Abdul R. Rahman, Thomas R. Schmidt, Edward E. Anderson, David S. Criz, and Karl R. Johnson Mar. 1974 21 p refs
(NASA Order T-20541-G; DA Proj. 1G7-62713-A-034)
(NASA-CR-140938; AD-779456; FL-190; USA-NLABS-TR-74-37-FL) Avail: NTIS HC $3.25 CSCL 06H

A study was inititated to develop an applesauce which resists caking when subjected to elevated temperatures such as 37.7 C for two weeks and/or 57 C for three hours as required by NASA. Juice was extracted from McIntosh apples at different levels ranging between 15.8% and 77.0% by weight. The following results were obtained: (1) the degree of caking of the freeze dried applesauce powder was correlated with the amount of juice extracted; (2) correlations were established between the percentage of juice extracted and each of the following: bulk density; soluble solids; and reducing sugars of the applesauce powders; and (3) reducing sugars appear to be the factor contributing most significantly to the caking with the higher reducing sugar levels producing the higher degrees of caking. Author

N75-12565 Joint Publications Research Service, Arlington, Va.
WEARING OF ANTI-G SUIT BY PERSONS WITH REDUCED ORTHOSTATIC STABILITY
V. A. Gornago, Yu. D. Pometov, B. F. Asyamolov, V. S. Panchenko, and B. S. Katkovskiy *In its* Space Biol. and Aerospace Med., Vol. 8, No. 5, 1974 (JPRS-63603) 6 Dec. 1974 p 108-112 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8, no. 5, 1974 p 73-75 (For availability see N75-12552 03-52)

N75-12569 Joint Publications Research Service, Arlington, Va.
RESPIRATORY ACTIVITY SENSOR USING CONDUCTING PAPER
N. A. Karnaukhova *In its* Space Biol. and Aerospace Med., Vol. 8, No. 5, 1974 (JPRS-63603) 6 Dec. 1974 p 124-126 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8, no. 5, 1974 p 82-84 (For availability see N75-12552 03-52)

55 PLANETARY BIOLOGY

Includes exobiology and extraterrestrial life.

N75-12622*# Minnesota Univ., Minneapolis. Div. of Environmental Health.
ENVIRONMENTAL MICROBIOLOGY AS RELATED TO PLANETARY QUARANTINE Progress Report, 1 Dec. 1972 - 31 May 1973
Irving J. Pflug 31 May 1973 44 p
(Grant NGL-24-005-160)
(NASA-CR-140941) Avail: NTIS HC $3.75 CSCL 06M

The mechanistic basis of the synergetic effect of combined heat and radiation on microbial destruction was analyzed and results show that radiation intensity, temperature, and relative humidity are the determining factors. Dry heat resistance evaluation for selected bacterial spore crops indicates that different strains of Bacillus stearothermophilus demonstrate marked differences in resistance. Preliminary work to determine the effects of storage time, suspending medium, storage temperature and spore crop cleaning procedures on dry heat survival characteristics of Bacillus subtilis var. Niger, and dry heat resistance of natural microflora in soil particles is also reported. G.G.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

No abstracts in this category.

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.

For components see *33 Electronics and Electrical Engineering*.

N75-12623# Toronto Univ. (Ontario). Computer Systems Research Group.
A STUDY OF LANGUAGE DIRECTED COMPUTER DESIGN Ph.D. Thesis - Stanford Univ.
David Barkley Wortman Dec. 1972 218 p refs
(CSRG-20) Avail: NTIS HC $7.25

Language directed computer design is an approach to designing computers which implements, in the machine hardware, operations and data structures normally associated with high level programming languages. The use of scientific experimentation as a tool for the design and evaluation of language directed computers is reviewed. The language directed design process is described and a historical survey of language directed computers is presented. Measurement of computer performance is described in terms of a cost-benefit function, and the experiments which may be constructed to improve the design of existing computers and to evaluate computer performance are assessed. The experimental techniques are also illustrated with a case study of the design, improvement, and evaluation of a language directed computer which implements a dialect of PL/1, and the techniques for evaluating computer performance are used to compare the improved PL machine with a contemporary general purpose computer, the IBM System/360. Author

N75-12624# Research Inst. of National Defence, Sundbyberg (Sweden).
COMPUTER TREATMENT OF CLIMATIC RESEARCH DATA. TABLE TYPE B [DATAMASKINELL BEARBETNING AV KLIMATOLOGISKA FOERSOEKSDATA: TABELL TYP B]
Staffan Loef and Ingemar Widegren Feb. 1973 37 p In SWEDISH
(FOA-1-C-1504-M4(H5-H6)) Avail: NTIS HC $3.75

A FORTRAN 4 program is described for selection, statistical treatment, and tabulation of data stored on memory disk with the program INKLIMAT. The program calculates for specified criteria, the average value and distribution of the defined experimental groups together with statistical comparisons between one reference group and each of three comparison groups. The deviations are given with the t values and their significances. Author

N75-12625# California Univ., Livermore. Lawrence Livermore Lab.
DESIGN OF A SECURE DATA TRANSMISSION SYSTEM: AN IMPLEMENTATION OF COMMUNICATION THEORY USING A MICROCOMPUTER M.S. Thesis
D. G. West May 1974 40 p refs
(Contract W-7405-eng-48)
(UCRL-51587) Avail: NTIS HC $3.75

This paper describes the development and implementation of a coding technique that provides a high level of security to a system that monitors the status of remote alarm sensor units over physically unprotected lines. It employs nonlinear pseudo-random sequence generator in both the central and remote units to produce nonrepeating sequences of digits that can be compared. Attempts to penetrate the system alter the transmitted digit sequence, producing a mismatch that sets off the alarm. Low power CMOS electronics makes it possible to operate the remote nonlinear pseudo-random sequence generators on power supplied over the same unprotected leased telephone lines that carry the data. This unique application of communication theory provides system integrity and reliable monitoring of remote status at moderate cost. NSA

N75-12626# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
POSSIBILITIES FOR THE CONSTRUCTION OF VARIOUS TYPES OF MULTI-VALUE ADDERS FROM MIXERS, SWITCHES, AND SPECTROTRONS
V. V. Maltsev, N. G. Motorev, and V. M. Tuzov 17 Jun. 1974 10 p refs Transl. into ENGLISH from the monograph "Mnogoustoichivye Elementy i ikh Primenenie, Sborik Statei" USSR, 1971 p 289-295
(AD-781323/1; FTD-HT-23-1023-74) Avail: NTIS HC $3.25 CSCL 09/2

The analysis shows that in using components with frequency coding, adders of very different types can be made which operate both in a position number system and in a system of residual classes. The use of an adder of one type or another must be determined by the concrete requirements for the device in which it is used. GRA

N75-12627# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
INPUT-OUTPUT INTERFACES FOR THE D17B BUS-STRUCTURED I/O SYSTEM M.S. Thesis
Richard M. Lundy Jun. 1974 143 p refs
(AD-785128; GE/EE74-27) Avail: NTIS CSCL 09/2

The Autonetics D17B guidance and control computer has been the subject of much study by the Electrical Engineering Department of the Air Force Institute of Technology. This special-purpose processor has been converted into a general-purpose minicomputer with a bus-structured I/O system. This report presents designs for peripheral interfaces which further expand the capabilities of the D17B system. A general interface design is presented to assist readers in implementing

their own interfaces. Then, the complete logic design of interfaces for a Model 33 Teletype, two paper tape readers, and a high-speed paper tape punch unit are presented. (Modified author abstract) GRA

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N75-12628# National Bureau of Standards, Washington, D.C. Inst. for Computer Sciences and Technology.
NBS FORTRAN TEST PROGRAMS. VOLUME 2: LISTINGS FOR VERSION 1
Frances E. Holberton and Elizabeth G. Parker Oct. 1974 221 p
(NBS-SP-399-Vol-2) Avail: SOD HC $2.85 as C13.10:399/V.2

The program listings and supporting input data for the NBS FORTRAN Test Programs, Version 1, are presented. The test programs are written in ASA Standard FORTRAN and test the language elements described in the ASA Standard FORTRAN document. The NBS FORTRAN Test Programs, Version 1, contain 116 test units, each structured as an executable FORTRAN program. Test units contain input data which is listed following the respective test unit. The program listings for the NBS FORTRAN Test Programs, Version 1 are included. For Vol. 3, see N75-12629. Author

N75-12629# National Bureau of Standards, Washington, D.C. Inst. for Computer Sciences and Technology.
NBS FORTRAN TEST PROGRAMS. VOLUME 3: LISTINGS FOR VERSION 3
Frances E. Holberton and Elizabeth G. Parker Oct. 1974 226 p
(NBS-SP-399-Vol-3) Avail: SOD HC $2.90 as C13.10:399/V.3

The program listings and supporting input data for the NBS FORTRAN Test Programs, Version 3, are presented. The test programs are written in ASA Standard FORTRAN and test the language elements described in the ASA Standard FORTRAN document. The NBS FORTRAN Test Programs, Version 3, containing the same 116 test units as Version 1 are structured into 14 executable FORTRAN programs. These have been organized for use on large FORTRAN processors for the purpose of reducing the number of systems control cards needed to perform the tests. Each executable program contains 6 input data records, 3 of which are available for user information. Additional input data records are included. The input data is listed following each respective program. The program listings for the NBS FORTRAN Test Programs, Version 3 are presented. For Vol. 2, see N75-12628. Author

N75-12630*# Martin Marietta Corp., Denver, Colo.
SCHEDULING LANGUAGE AND ALGORITHM DEVELOPMENT STUDY. APPENDIX: STUDY APPROACH AND ACTIVITY SUMMARY Final Report
Nov. 1974 73 p 3 Vol.
(Contract NAS9-13616)
(NASA-CR-140363; MCR-74-314) Avail: NTIS HC $4.25 CSCL 09B

The approach and organization of the study to develop a high level computer programming language and a program library are presented. The algorithm and problem modeling analyses are summarized. The approach used to identify and specify the capabilities required in the basic language is described. Results of the analyses used to define specifications for the scheduling module library are presented. J.M.S.

N75-12631*# Modern Systems Analysis, Inc., Ann Arbor, Mich.
NEIGHBORING OPTIMAL GUIDANCE THEORY AND COMPUTER PROGRAM Final Report
William F. Powers Oct. 1974 34 p refs
(Contract NAS9-14103)
(NASA-CR-140332; Rept-9-14103-F) Avail: NTIS HC $3.75 CSCL 09B

Developments of the linear quadratic optimal control problem are discussed. The theory is applicable to the development of neighboring optimal feedback guidance gains, and is useful as a tool for synthesizing feedback control laws. A computer program which requires only the pertinent matrices of the linear quadratic problem is described. Author

N75-12632# Joint Publications Research Service, Arlington, Va.
NATURAL SCIENCE RESEARCH APPLICATION OF METHODS OF TEACHING A MACHINE PATTERN RECOGNITION WITHOUT A TEACHER
E. M. Brauerman, A. A. Dorofeyuk, and V. Ya. Lumel'skiy 21 Nov. 1974 9 p refs Transl. into ENGLISH from Raspoznavaniye Obrazov. Adaptivnyye Sistemy (Moscow), 1971 p 112-117
(JPRS-63501) Avail: NTIS HC $3.25

Methods of obtaining formal classifications in mineralogy and retrogressive morphology are presented and compared with available classifications. The formal classifications were obtained using the same algorithm. Author

N75-12633# Research Inst. of National Defence, Sundbyberg (Sweden).
SUPPORTING PROGRAM AND PROGRAM SYSTEM FOR THE ASSEMBLY PROGRAM IN TIROS [HJAELPPROGRAM OCH PROGRAMSYSTEM FOER ASSEMBLYPROGRAMMERING I TIROS]
Carl Reuterswaerd Oct. 1972 40 p In SWEDISH
(FOA-1-C-1470-C4) Avail: NTIS HC $3.75

A number of shortened instructions have been collected for the use of 26 support programs in the TIROS system computer. The program refers to diagnosing and editing the program, in the memory drum, on punched tape, and in DEC tape; loading and dumping data in the memory drum, sub routines for DEC tape in TSSOUT; segmentation of programs; sorting of text lines etc. Author

N75-12634# Research Inst. of National Defence, Stockholm (Sweden).
LECO: A COMPACTING AND EDITING PROGRAM [LECO: ETT KOMPAKTERINGS-OCH EDITERINGS-PROGRAM]
Kalle Maekilae Feb. 1973 44 p In SWEDISH
(FOA-P-C-8353-M3(E5)) Avail: NTIS HC $3.75

LECO is a program for IBM 360/370 which facilitates the management of such basic programs and computer data as are wanted for recording on a memory disc. By means of LECO a basic program can be stored in a very compact form on memory discs. When this packed program is wanted for use, a combined unpacking and updating is carried out as a stage before compilation. LECO packs the program in two ways. In one it takes away all blanks at the beginning and end of each punched card. In the other it codes frequently occurring phrases (e.g. 'INTEGER') into compact single sign forms. The space required for a basic program is reduced to approximately one quarter of the original. Since the program is condensed so much it can often be recorded on active disc packs. Author

N75-12635# Research Inst. of National Defence, Stockholm (Sweden).
INTRODUCTION TO LECO [INTRODUKTION TILL LECO]
Jacob Palme Mar. 1973 18 p refs In SWEDISH
(FOA-P-C-8355-M3(E5)) Avail: NTIS HC $3.25

LECO is a program for IBM 360/370 which facilitates the management of basic programs and other texts stored on memory discs. LECO enables the texts to be stored in very compact form - the space needed being only one quarter the size of the original amount of text. It is very convenient, with the help of LECO to introduce alterations at arbitrary places in the stored text. The text can, via LECO be transferred to compilers or other programs which will produce the text. This introduction gives enough information for the reader to begin using LECO. The instructions are not intended to give complete description of all the possibilities of LECO. Author

N75-12636# Research Inst. of National Defence, Sundbyberg (Sweden).
FORTRAN DIALECTS: A SELECTION

Eva Koenberg and Ingemar Widegren Feb. 1973 75 p refs
(FOA-1-C-1500-M4) Avail: NTIS HC $4.25

A guiding map of different FORTRAN dialects is presented of special interest for programmers, system engineers and researchers at the Swedish Institute of National Defense. ANSI and ISO FORTRAN are also mapped to facilitate recommendations for usage of the dialects. Some comments on each computer's characteristics are presented. Author

N75-12637# Research Inst. of National Defence, Stockholm (Sweden).
ROUTINES FOR USING SCREEN PRESENTATION OF EMR 6130 EQUIPMENT [RUTINER FOER ANVAENDANDE AV BILDSKAERMEN VID EMR 6130-ANLAEGGNINGEN]
Ingrid Runborg Oct. 1972 10 p In SWEDISH
(FOA-3-C-3727-E5) Avail: NTIS HC $3.25

Routine procedures are described for generating graphical information on the screen of EMR 6130 equipment. The procedure packet corresponds to plotting with the same equipment. The routines are written in FORTRAN. Author

N75-12638# Research Inst. of National Defence, Stockholm (Sweden).
INTRODUCTION TO THE STRUCTURE OF DIALOGUE DIRECTED COMPUTER PROGRAMS [INTRODUKTION TILL STRUKTURERING AV DIALOGINRIKTADE DATORPROGRAM]
Sten Leijonhufvud Mar. 1973 37 p refs In SWEDISH
(FOA-P-C-8361-M3) Avail: NTIS HC $3.75

Advice is given to FORTRAN programmers on running dialogue directed programs. It is mainly directed to programmers who wish to use the DEC system-10 at the Stockholm Computer Centre. Author

N75-12639# Research Inst. of National Defence, Stockholm (Sweden).
PL360 COMPILER WITH MACROS
Lars Enderin Mar. 1973 45 p refs
(FOA-P-C-8359-M3(E5)) Avail: NTIS HC $3.75

Some extensions of the PL360 programming language are described. PL360 is a machine dependent programming language with Algol-like structure, designed specifically for the IBM 360. PL360 provides direct access to all facilities of the computer with the same inherent efficiency as an assembly language. The PL360 compiler is very fast. The version of the compiler described in this report contains a simple macro processor, and some other additional features designed to make PL360 more useful for software development. Author

N75-12640# Witwatersrand Univ., Johannesburg (South Africa). School of Mechanical Engineering.
A COMPUTER PROGRAMME FOR FLOWFIELD PREDICTIONS IN THE INTERACTION OF A SHOCK WAVE WITH A 90 DEGREE BEND
K. Meinjes and B. W. Skews Jul. 1974 57 p refs
(Rept-58) Avail: NTIS HC $4.25

A FORTRAN program, based on an Eulerian finite difference (fluid-in-cell) method is described. The program is used for the prediction of the unsteady flowfield during shock wave interaction with a right angled corner in two-dimensional cartesian or axisymmetric cylindrical coordinates. The program is described in detail and its use is illustrated by examples. Adaptation to other problems with similar geometries is discussed. Good agreement with experimental data is obtained for those cases where comparisons are made. Author

N75-12641# Aerojet Nuclear Co., Idaho Falls, Idaho.
REBAL COMPUTER PROGRAM SERIES FOR LINEAR PROPAGATION OF UNCERTAINTY
J. B. Fussell and N. H. Marshall May 1974 25 p refs
(Contract AT(10-1)-1375)
(ANCR-1153) Avail: NTIS HC $3.25

The theory used for development of the REBAL computer program series for linear propagation of uncertainty in computer assisted engineering computations is given. The approximations used in REBAL are presented. Emphasis is placed on the interpretation of the input and output as calculated by REBAL. This report is written for engineers with only basic statistical background. Author

N75-12642# Sandia Labs., Livermore, Calif.
APPLICATION SOFTWARE FOR ELECTRON MICROPROBE ANALYSIS AND DATA REDUCTION
D. E. Benthusen and W. B. Estill Jun. 1974 36 p refs
(Contract AT(29-1)-789)
(SLL-74-5) Avail: NTIS HC $3.75

Applications software developed to control an automated electron microprobe during data acquisition and to reduce the raw data into percentages of each elemental constituent is described. A high-level interpretive computer language called CLASS was used to write the software and a special adaptation of MAGIC 4 was used to make the X-ray intensity corrections. Author (NSA)

N75-12643# California Univ., Los Angeles.
EXPERIMENT WITH METHODOLOGIES FOR THE SPECIFICATION OF PROGRAMMING SYSTEMS
C. J. Lucena and G. E. Tompkins 1973 6 p refs Presented at the 7th Asilomar Conf. on Circuits, Systems, and Computers, Pacific Grove, Calif., 27 Nov. 1973
(Contract AT(04-3)-34)
(UCLA-10-P-14-128; Conf-731147-1) Avail: NTIS HC $3.25

The possible impact of a number of emerging methodologies on the design and production of software is analyzed. The current high cost of software indicates that considerable methodological improvements for software production are critical factors for the development of computer technology. An experiment with programming is used as the basis for discussion of such topics as: (1) formalisms for systems specification; (2) hierarchical structure of systems; and (3) modularity and approaches for testing and debugging. Author

N75-12644# Sandia Labs., Albuquerque, N.Mex.
CONVERSION OF BOUNDARY-VALUE PROBLEMS INTO STABLE INITIAL-VALUE PROBLEMS VIA SEVERAL INVARIANT IMBEDDING ALGORITHMS
M. B. Scott 1974 70 p refs Presented at the Conf. on Numerical Soln. of BVP for ODE, College Park, Md., 10 Jun. 1974 Sponsored by AEC
(SAND-74-5018; Conf-740627-1) Avail: NTIS HC $4.25

Some of the practical implications of the implementation of the various imbedding algorithms on a computer are discussed. The basic algorithms for solving linear inhomogeneous second order problems are reported and the calculation of eigenvalues and characteristic lengths for linear homogeneous problems is outlined. Nonlinear second order problems and multi-point boundary values problems are considered. Author

N75-12645# Sandia Labs., Albuquerque, N.Mex.
PRIME IMPLICANT ALGORITHM WITH FACTORING
B. L. Hulme and R. B. Worrell May 1974 14 p refs
(Contract AT(29-1)-789)
(SLA-74-218) Avail: NTIS HC $3.25

An algorithm for finding the prime implicants of a Boolean function is given. The algorithm is similar to Nelson's algorithm since both involve the operations of complementing, expanding, and simplifying, but the new algorithm includes the additional operation of factoring. The algorithm with factoring is proved, and it is shown that factoring accounts for a dramatic increase in efficiency over Nelson's algorithm. The increased efficiency is illustrated with timing results obtained from several examples that were implemented for both algorithms using the symbolic manipulation system. Author (NSA)

N75-12646# California Univ., Livermore. Lawrence Livermore Lab.
INTERACTIVE DIGITAL IMAGE PROCESSING AND DISPLAY SYSTEM
C. H. Journeay, L. L. Hayes, M. P. Ekstrom, M. C. Wirth, and L. Hatfield (Calif. Univ., Davis) 29 Apr. 1974 14 p Presented at the 2d AEC Sci. Computer Inform. Exchange Meeting, New York, 2 May 1974 Sponsored by AEC
(UCRL-75655; Conf-740512-11) Avail: NTIS HC $3.25

The development of a highly interactive digital image processing and display system is discussed. The system provides

a display system to the existing computer network (OCTOPUS), with coupling of mass on-line storage, large-scale computational power, and high quality display capability using high speed communication links to provide a flexible research tool. A supporting software system is provided which allows user interaction in several ways. The system is characterized by an ability, on a routine basis, to perform complex image processing calculations, display the results, support local interaction with the displayed image, and return to further necessary processing at a rate not previously obtainable. Author

N75-12647# Sandia Labs., Albuquerque, N.Mex.
USER'S GUIDE FOR PROGRAM ISOPLT TO PLOT ISOTHERMS
C. E. Sisson Jun. 1974 56 p refs
(Contract AT(29-1)-789)
(SLA-74-242) Avail: NTIS HC $4.25

Program ISOPLT may be used to graphically present temperature results, either calculated or from tests, as constant temperature contours (isotherms). The finished quality SD-4020 plots generated may be obtained as hardcopy plots or as a movie to show isotherms versus time. Use of HEATMESH to obtain diffusion node coordinates and connector data needed for isotherm model geometry is also described. NSA

N75-12648# TRW Systems Group, Redondo Beach, Calif.
DEPARTMENT OF DEFENSE SPACE SHUTTLE ON-BOARD SOFTWARE REQUIREMENTS Technical Report, Mar. - Jul. 1974
D. B. Urfrig Jul. 1974 441 p refs
(Contract F04701-74-C-0316)
(AD-785123; TRW-25475-6006-TU-00; SAMSO-TR-74-155) Avail: NTIS CSCL 22/2

This document presents a baseline set of DOD space shuttle on-board software requirements prepared under the direction of the Space and Missile Systems Organization (AFSC). These requirements are concerned with the DOD operational use of the space shuttle and pertain to that portion of the software which resides in the orbiter's on-board general purpose computers (five IBM AP-101's) and their two associated mass memories. Emphasis is placed on the payload management and payload handling functions because these functional areas are of particular importance to DOD as an operational user of the space shuttle. Other functions addressed are guidance, navigation, flight control, systems management, displays and controls, flight computer operating system, system interfaces, and mission planning. Author (GRA)

N75-12649# Air Force Eastern Test Range, Patrick AFB, Fla.
A COMPILATION OF PAPERS PRESENTED AT THE ON-AXIS SOFTWARE CONFERENCE Final Report
Sep. 1972 516 p refs Presented at the On-Axis Software Conf., Patrick AFB, Fla., 25-27 Jun. 1974
(AD-785218; AFETR-TR-74-01) Avail: NTIS CSCL 09/2

The papers presented at the On-Axis Software Conference are reported. The following subjects were discussed: AFETR on-axis developments; advanced technology for on-axis software; dynamic weighting of the antenna control subsystem; generation and utilization of radar measurements; on-axis software design considerations; computer aided track for AN/MPS-36 radar at Kwajalein Missile Range, I-KMR environment, constraints and system concept; computer aided track for AN/MPS-36 radars at Kwajalein Missile Range, II-MPS-36 software description; SAMTEC AN/FPQ-14 on-axis radar performance evaluation; operational considerations for on-axis software systems; Eglin powered flight investigations; on-axis applications of the RISP simulation; investigation of alpha-beta filter improvement using the on-axis radar simulation program; on-site evaluation and calibration software, pre-pass calibration and evaluation program, basic on-axis system tests; orbit determination for on-site evaluation and calibration; real-time Kalman analytical study, and AFETR on-axis radar system evaluation. Author

N75-12650# Brown Univ., Providence, R.I. Div. of Applied Mathematics.
HEURISTIC-ADAPTIVE SEARCH FOR REGIMES IN A STRING OF DATA
Beng-Tung Ang Jul. 1974 169 p refs
(Contract N00014-67-A-0191-0026)
(AD-784473) Avail: NTIS CSCL 09/2

Contents: A heuristic-adaptive algorithm for regime identification; Linear analysis; Modeling performance of heuristic-adaptive algorithm; Robustness studies. GRA

N75-12651# Stanford Univ., Calif. Systems Optimization Lab.
A DECOMPOSITION METHOD FOR THE SOLUTION OF DUAL-ANGULAR INTEGER PROGRAMS
Keven J. Reardon Aug. 1974 84 p refs
(Contracts DAHC04-74-C-0034; F44620-74-C-0079; N00014-67-A-0112-0058; Grant NSF GJ-31521; NR Proj. 047-061)
(AD-785568; SU-SOL-74-10; AROD-12215-1-M) Avail: NTIS CSCL 12/2

Integer linear programming problems whose constraint matrices have dual-angular structures arise in several types of applications, particularly those which seek to specify a strategy for future actions based on observed results of previous decisions. An implicit enumeration method for integer linear programming is developed for application to problems with such dual-angular constraint matrices. (Modified author abstract) GRA

62 COMPUTER SYSTEMS

Includes computer networks.

N75-12652*# National Aeronautics and Space Administration. Pasadena Office, Calif.
MULTI-COMPUTER MULTIPLE DATA PATH HARDWARE EXCHANGE SYSTEM Patent Application
Tage O. Anderson, inventor (to NASA) Filed 6 Nov. 1974 41 p
(Contract NAS7-100)
(NASA-Case-NPO-13422-1; US-Patent-Appl-SN-521601) Avail: NTIS HC $3.75 CSCL 09B

Improvements made in mutiple data path switching exchanges for multi computer processing systems are reported. NASA

N75-12653# Research Inst. of National Defence, Sundbyberg (Sweden).
COMBINED USE OF TIROS AND DETEF SYSTEMS FOR PROGRAMMING, DATA COLLECTION AND EVALUATION OF DATA OUTPUT [KOMBINERAD ANVAENDNING AV TIROS-OCH DETEFSYSTEM FOER PROGRAMMERING, DATAINSAMLING OCH DATAUTVAERDERING]
Carl Reuterswaerd Dec. 1972 8 p In SWEDISH
(FOA-1-C-1474-C4) Avail: NTIS HC $3.25

With the object of extending the usefulness of a small computer system PDP8/E, which has recently been installed in FOA1, a packet routine has been developed for transferring the program and data between the new machine and the older and larger computer system PDP8/1 (FUSK). The report is a guide for using the new routines. Author

N75-12654# Research Inst. of National Defence, Stockholm (Sweden).
FOA INDEX ADAPTATION OF ILO'S INFORMATION SYSTEM ISIS FOR OPERATING IN THE COMPUTER CENTER, STOCKHOLM IN COOPERATION WITH THE STATE OFFICE [FOA INDEX' ANPASSNING AV ILO'S INFORMATIONSSYSTEM ISIS FOER DRIFT PA STOCKHOLMS DATAMASKINCENTRAL I SAMARBETE MED STATSKONTORET]
Lars Andersson Mar. 1973 15 p refs Partly in SWEDISH and partly in ENGLISH
(FOA-P-C-8360-M7) Avail: NTIS HC $3.25

The information system ISIS was adapted for operation in Stockholm's computer center. ISIS is a system for both data collection and interactive search for information. Author

N75-12655# Research Inst. of National Defence, Stockholm (Sweden).
DURATION OF PROGRAM FOR PROGRAM OPTIMIZATION [PROGRAMVARA FOER PROGRAMOPTIMERING]

Stefan Arnborg Jan. 1973 65 p refs In SWEDISH
(FOA-P-C-8350-M3(E5)) Avail: NTIS HC $4.25

Examinations of production programs have shown that compilers and programmers devote too much time on code optimization which does not measurably affect the program's running costs. By taking measurements on the program while it is operating one can quickly establish whether optimization of a program would result in a reasonable return. The report describes instrumentation for these measurements, partly in general and partly in specific cases. The latter includes two program packets for measuring the performance of an arbitrary S360 program and an arbitrary SIMULA program respectively. Author

N75-12656# Research Inst. of National Defence, Stockholm (Sweden).
A REVIEW OF PICTURE PROCESSING BY COMPUTER [EN OEVERSIKT OEVER BILDBEHANDLING PA DATOR]
Torleiv Orhaug Dec. 1972 28 p refs In SWEDISH
(FOA-2-C-2583-E1) Avail: NTIS HC $3.75

A detailed description and discussion about picture processing by computers are presented, starting with comments on the concept of pictures. Different types and objectives of mechanical picture processing are discussed. The structure and characteristics of pictures are summarized and the linear transfer theory is applied. Different ways of representing the pictures' contrast information are considered especially with reference to its use by computers. Linear picture operations are discussed in detail with special reference to producing pictures in the spectral plane. Author

N75-12657# Research Inst. of National Defence, Stockholm (Sweden).
FLEXIBLE TABLE PRINTING SUBROUTINES IN FORTRAN
Goeran Fick Jan. 1973 65 p refs
(FOA-2-C-2590-E5) Avail: NTIS HC $4.25

A set of subroutines for table printing is presented. The user may choose table size, own variable names, own output FORMAT's etc. The subroutines are written in standard FORTRAN, and may be implemented on most computer installations. Partly unconventional programming techniques are included. Author

N75-12658# Research Inst. of National Defence, Stockholm (Sweden).
A PROGRAM FOR LISTING CARD INDICES FOR A4 REPORTS [ETT PROGRAM FOER LISTNING AV KORTBILDER FOER A4-RAPPORTER]
Goeran Fick Jan. 1973 12 p refs In SWEDISH
(FOA-2-C-2589-E5) Avail: NTIS HC $3.25

The setting up of subroutines for writing tables is described. The operator can select table sizes, their own variable name, their own printed FORMAT, etc. The subroutines, which are written in standard FORTRAN, can be implemented in most installations but to some extent require unconventional programming technique. Author

N75-12659# Research Inst. of National Defence, Stockholm (Sweden).
X-FOC: A HELP PROGRAM FOR 8-16 K TIROS-FOCAL [X-FOC - ETT HJALPPROGRAM FOER 8 - 16 K TIROS-FOCAL]
Johan Santesson Mar. 1973 26 p In SWEDISH
(FOA-1-C-1507-C2(C4)) Avail: NTIS HC $3.75

With the help of X-FOC program, TIROS-FOCAL can make use of an 8-16k memory drum. The running time for the program using large scale DEC-tape can accordingly, be reduced by 30 to 90%. The report is mainly intended for the guidance of X-FOC users. Author

N75-12660# Research Inst. of National Defence, Stockholm (Sweden).
A SYSTEM FOR INPUT AND OUTPUT OF DIGITAL PICTURES
Jan-Olof Eklundh Nov. 1972 52 p refs
(FOA-2-C-2573-E1) Avail: NTIS HC $4.25

An introduction to the theory of picture processing by computer is given in preface to a system description which discusses the electro-mechanical scanner and cathode ray tube display device which are employed in the input/output processing of digital pictures. Author

N75-12661# California Univ., Berkeley. Lawrence Berkeley Lab.
BARELY INTELLIGENT TERMINAL
H. H. Holmes Mar. 1974 22 p refs Presented at 2d AEC Sci. Computer Inform. Exchange Meeting, New York, 1 May 1974 Sponsored by AEC
(LBL-2676; Conf-740512-10) Avail: NTIS HC $3.25

A system for effective use of an intelligent terminal for graphics applications is described. It provides extensions to the basic hardware capabilities such as display subroutines and display scaling, and light pen tracking and inking. It supports a variety of local manipulations on display files which have been supplied by a host. Author

N75-12662# California Univ., Livermore. Lawrence Livermore Lab.
INTRODUCTION TO RATS (RISOS/ARPA TERMINAL SYSTEM): AN OPERATING SYSTEM FOR THE DEC PDP-11/45
C. Landau 1 Mar. 1974 297 p refs
(Contract W-7405-eng-48)
(UCRL-51582) Avail: NTIS HC $8.75

RATS (RISOS/ARPA Terminal System) is a virtual memory, multiprogramming operating system for the DEC PDP-11/45. It makes use of the full capabilities of the PDP-11/45 memory management unit to provide a very general virtual memory facility for PDP-11 programs. In addition, it provides system facilities which allow the system to be extended by users. Also, RATS provides a high degree of security for programs and data, and services terminals in order to permit interactive communication both with the PDP-11/45 and with remote machines. Author

N75-12663# Kernforschungszentrum, Karlsruhe (West Germany). Inst. fuer Datenverarbeitung in der Technik.
COORDINATION OF CRITICAL ACCESS TO DISTRIBUTED DATABANKS IN COMPUTER NETWORKS BASED ON DECENTRALIZED CONTROL
E. Holler Apr. 1974 112 p refs In GERMAN
(KFK-1967) Avail: AEC Depository Libraries HC $8.75

This report presents several solutions to the coordination problem, applying a decentralized control mechanism. The different solutions are compared relative to their efficiency by means of experiments using a computer network simulation model. NSA

N75-12664# Naval Ordnance Lab., White Oak, Md.
TAXICRINIC PROCESSORS OF THE ILLIAC 3: ARCHITECTURAL DESIGN
B. J. Nordmann, Jr. and B. H. McCormick (Illinois Univ., Chicago) 1974 58 p refs
(Contract AT(11-1)-2118)
(TID-26602) Avail: NTIS HC $4.25

The functional architecture of the taxicrinic processors, which serve as central control units for the Illiac 3 computer system, is examined in terms of system performance in the manipulation, search, and systemization of abstract graphs (bilateral list structures) which are produced from the pictorial analyzer of the machine. Extensive pointer facilities, including the hardware automation of subroutine calls, available space allocation, and a memory segmentation strategy are also treated in the overview. Author

N75-12665# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
INTERFACE MESSAGE PROCESSORS FOR THE ARPA COMPUTER NETWORK Quarterly Technical Report, 1 Apr. - 30 Jun. 1974
Jul. 1974 48 p
(Contract F08606-73-C-0027; ARPA Order 2351)
(AD-784951; BBN-2852; QTR-6) Avail: NTIS CSCL 09/2

The ARPA computer network provides a communication medium which allows dissimilar computers (Hosts) to interchange information. Each Host is connected to an Interface Message Processor (IMP), and IMPs are interconnected by leased common carrier circuits. There is frequently no direct circuit between two communicating Hosts, and the intermediate IMPs store and forward the information. IMPs regularly exchange information

which is used to adapt routing to changing network conditions. IMPs also report a variety of parameters to a Network Control Center, which coordinates diagnosis and repair of malfunctions. The Terminal IMP (TIP) permits the direct attachment of 63 character-oriented terminals. The Satellite IMP (SIMP) will allow multi-station use of a single earth satellite channel. (Modified author abstract) GRA

N75-12666# Illinois Univ., Urbana. Coordinated Science Lab.
ON HIGH LEVEL DIGITAL SYSTEM DESIGN Ph.D. Thesis
James Bryon Peterson Jul. 1974 128 p refs
(Contract DAAB07-72-C-2219)
(AD-785570; R-653; UILU-ENG-74-2059) Avail: NTIS CSCL 09/2

A design system to elevate the level at which complex digital systems are designed is developed. The top down methodology, designing from the concept toward its implementatin in a manner which does not force premature binding of system tradeoff considerations, is investigated to determine its impact on the system of representation. The resulting design language is a higher level language which is a design aid rather than just a descriptive notation. Its unique features include: (1) a partial ordering representation of the execution sequence, (2) a complete separation of the control and data structure of the design into node and leaf procedures, and (3) control constructs which make the language a structured programming language for designing digital systems. (Modified author abstract) GRA

N75-12667# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
NATURAL COMMUNICATION WITH COMPUTER 4 Quarterly Progress Report, 1 Apr. - 30 Jun. 1974
Aug. 1974 54 p refs
(Contract DAHC15-71-C-0088; ARPA Order 1967)
(AD-784231; BBN-2869) Avail: NTIS CSCL 09/2

Natural Communication with Computer 4 broad based computer science research and development work is performed in areas including: speech understanding systems, speech compression, development of programs and programming aids, techniques for extending computer I/O capabilities, research and development on time sharing systems, and distributed computation. This research program involves the ability to represent knowledge and deal with it in computer oriented terms, requires systems capable of high degree of man-machine interaction, and draws upon many diverse fields such as linguistics, communications, programming, hardware development, speech recognition, etc. to facilitate fuller use of the enormous potential of natural modes of communication with computers. Author (GRA)

N75-12831 Joint Publications Research Service, Arlington, Va.
INSTALLATION OF R-20 COMPUTER DESCRIBED
Krystyn Bernatowicz *In its* Transl. on Eastern Europe: Sci. Affairs, No. 439 (JPRS-63487) 20 Nov. 1974 p 14-15 Transl. into ENGLISH from Informatyka (Warsaw), no. 7-8, Jul.-Aug. 1974 p 46-49 (For availability see N75-12829 03-81)

63 CYBERNETICS

Includes feedback and control theory.
For related information see also *54 Man/System Technology and Life Support.*

N75-12668 Riga Polytechnical Inst. (USSR).
CYBERNETIC METHODS IN DIAGNOSTICS
Isdatelstvo Zinatne 1973 134 p refs In RUSSIAN
Copyright. Avail: Issuing Activity

Topics considered include technical diagnostics, models for control objectives, problems of cybernetics, and identification. Mathematical models are presented for various diagnostic problems in the fields of acoustics and statistical analysis. Iteration schemes are presented, and synthesis and identification are discussed in relation to linear systems, impulse transition functions, optimization, and complex dynamic systems. Author

N75-12669*# Systems Research Lab., Champaign, Ill.
RESEARCH STUDY ON STABILIZATION AND CONTROL MODERN SAMPLED-DATA CONTROL THEORY. DESIGN OF THE LARGE SPACE TELESCOPE SYSTEM Bimonthly Report
B. C. Kuo and G. Singh 7 Nov. 1974 38 p refs
(Contract NAS8-29853)
(NASA-CR-120534) Avail: NTIS HC $3.75 CSCL 12A

The numerical technique is applied to the prediction of self-sustained oscillations in a two-axis model of the nonlinear system with sampled data. The sampled-data two-axis LST system model, and its stability equation are analyzed along with the exact solution of the stability equation by numerical-iterative techniques. F.O.S.

N75-12670# Naval Ordnance Lab., White Oak, Md.
MODULAR ASYNCHRONOUS CONTROL DESIGN
B. J. Nordmann, Jr. and B. H. McCormick (Ill. Univ., Chicago) 1974 51 p refs
(Contract AT(11-1)-2118)
(TID-26601) Avail: NTIS HC $4.25

This paper discusses a modular design strategy for the implementation of control logic. After discussing several basic control modules, the overall design of control sequencing is described and a particular control sequence taken from the Illiac III computer is worked as an example of the technique. Finally the diagnostic features incorporated as part of the technique are discussed and a comparison is made with microprogramming. NSA

N75-12671# California Univ., Los Angeles. Dept. of System Sciences.
TIME-OPTIMAL CONTROL SYNTHESIS FOR NON-LINEAR SYSTEMS: A FLIGHT DYNAMIC EXAMPLE
A. V. Balakrishman 1974 26 p refs
(Grant AF-AFOSR-2492-73; AF Proj. 9769)
(AD-785405; AFOSR-74-1450TR) Avail: NTIS CSCL 12/1

The determination of optimal closed-loop control (or on line control) laws is often referred to in the mathematics literature as the synthesis problem. Except for the well-known case of linear dynamics, quadratic criteria, this problem is still largely unsolved. This paper presents a local approximation technique for time-optimal control synthesis of a class of non-linear systems: specifically, point-to-point aerodynamic flight in a resisting medium. Preliminary computational results are presented, indicating that the approximation technique is feasible. Author (GRA)

N75-12672# Texas Univ., Austin. Center for Cybernetic Studies.
SOME BASIC PROPERTIES OF THE PAYOFFS DEFINED BY CLOSED-LOOP STRATEGIES
J. Bradley and P. L. Yu Jul. 1974 38 p refs
(Contracts N00014-67-A-0126-0008;
N00014-67-A-0126-0009; NR Proj. 047-021)
(AD-784434; CS-178) Avail: NTIS CSCL 12/2

Let x = f(x, mu, nu) be the kinematic equation of a 2-person, zero-sum differential game where (mu, nu) is of class C(m) on the playing space. It is shown that, whenever f(x, mu, nu) is not tangent to the terminal surface C, there exists a neighborhood of C in which every point y can be uniquely represented as (tau, y sub o), where epsilon is a solution to the kinematic equations, y sub o is in C, and 7 is the time until the path originating at y meets y sub o. This representation yields two functions W(y; mu, nu), the payoff at y resulting from (mu, nu), and T(y; mu, nu) the terminating time from y. It is shown that these functions are of class C(m) and their gradients satisfy the same adjoint equation but with different initial transversality conditions, even when (mu, nu) are not optimal. These results are then extended to a carefully defined class of discontinuous strategies, those containing a transition surface or discontinuity manifold. Lastly these results are used to give a condition for closed-loop optimality in optimal control problems and for semipermeability in differential games. These results are easily generalizable to n-player games. Author

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N75-12673+ Engineering Sciences Data Unit, London (England).
THE STABILITY AND RESPONSE OF LINEAR SYSTEMS. PART 2: METHODS OF DISPLAYING STABILITY CHARACTERISTICS
Aug. 1974 18 p Sponsored by Roy. Aeron. Soc.
(ESDU-74020-Pt-2) Copyright. Avail: NTIS HC $98.50

Methods of graphical presentation are considered that display the effects on system characteristics of varying some of its parameters. The methods are the root locus and the one parameter stability diagram, which are alternative ways of showing how variations in one parameter affect the damping and frequency of the modes of motion. The two parameter stability diagram displays the effect on the system stability of varying two parameters. Author

N75-12674*# Texas A&M Univ., College Station. Dept. of Physics.
A THREE PARAMETER ANALYTIC PHASE FUNCTION FOR MULTIPLE SCATTERING CALCULATIONS
George W. Kattawar 26 Sep. 1974 25 p refs Submitted for publication
(Grant NGR-44-001-117)
(NASA-CR-140998; Rept-13) Avail: NTIS HC $3.25 CSCL 12A

A simple procedure was developed to fit the first three moments of an actual phase function with a three parameter analytic phase function. The exact Legendre Polynomial decomposition of this function is, suitable for multiple scattering calculations. The use of this function is expected to yield excellent flux values at all depths within a medium. Since it is capable of reproducing the glory, it can be used in synthetic spectra computations from planetary atmospheres. Accurate asymptotic radiance values can also be achieved as long as the single scattering albedo omega sub 0 is greater than or equal to 0.9. Author

N75-12675*# Texas A&M Univ., College Station. Dept. of Mathematics.
OBTAINING INITIAL VECTORS FOR MINIMIZING THE PROBABILITY OF MISCLASSIFICATION
L. F. Guseman, Jr. and Bruce P. Marion Sep. 1974 18 p refs
(Contract NAS9-13894)
(NASA-CR-140348) Avail: NTIS HC $3.25 CSCL 12A

A method is presented for computing initial vectors to be used in conjunction with a numerical optimization procedure for minimizing the probability of misclassification. Preliminary numerical results are presented. Author

N75-12676# Research Inst. of National Defence, Stockholm (Sweden).
THE AUTOMATIC COMPUTATION OF THE COEFFICIENTS IN A CLASS OF MODIFIED MULTISTEP METHODS
Gunnar Bjurel Nov. 1972 15 p refs
(FOA-2-C-2571-M4) Avail: NTIS HC $3.25

A method and a computer program are described for the computation of coefficients in a class of modified multistep methods intended for the solution of stiff ordinary differential equations. Author

N75-12677# Research Inst. of National Defence, Stockholm (Sweden).
MODIFIED MULTISTEP METHODS FOR THE NUMERICAL SOLUTION OF A CLASS OF STIFF ORDINARY DIFFERENTIAL EQUATIONS
Gunnar Bjurel Nov. 1972 12 p refs
(FOA-2-C-2570-M4) Avail: NTIS HC $3.25

Stiff systems of ordinary differential equations arise in many different fields of application, such as dynamics, electrical circuit and control problems, chemical reactions, and reactor kinetics. A description of these problems and methods used to solve them are presented. Author

N75-12678# Tokyo Univ. (Japan). Inst. of Space and Aeronautical Science.
ON MASTER BOLTZMANN EQUATION
Shunichi Tsuge and Kensi Sagara Nov. 1974 21 p refs
(ISAS-516-Vol-39-13) Avail: NTIS HC $3.25

It is shown that Boltzmann's equation written in terms of microscopic density has wider range of validity as well as finer resolvability for fluctuations than the conventional Boltzmann equation governing Boltzmann's function. The Boltzmann equation for ideal gases has implication as microscopically exact continuity equation like Klimontovich's equation for plasmas, and can be derived without invoking any statistical concepts, e.g., distribution functions, or molecular chaos. The Boltzmann equation in older formalism is obtained by averaging this equation only under a restricted condition of the molecular chaos. The new Boltzmann equation is seen to contain informations comparable with Liouville's equation, and serves as a master kinetic equation. A hierarchy system is formulated in a parallelism to the BBGKY hierarchy. They are shown to yield an identical one-particle equation. Author

N75-12679# Commissariat a l'Energie Atomique, Fontenay-aux-Roses (France). Dept. de Protection.
STUDY OF MULTIPLE TIME SERIES BY DATA ANALYSIS
J. M. Braum May 1974 117 p refs In FRENCH
(CEA-R-4561) Avail: AEC Depository Libraries

Dynamic and statistical approaches used to study multiple time series by data analysis are examined. Advantages and disadvantages of these procedures are given along with the mathematical formulation of the problem. Transl. by E.H.W.

N75-12680# Gulf Nuclear Fuels Co., Elmsford, N.Y.
DIRECT METHOD BASED PROJECTIONS FOR SOLVING SYSTEMS OF LINEAR EQUATIONS
D. W. Harms and R. F. Keller May 1974 71 p refs
(Contract AT(11-1)-2210)
(IS-3396) Avail: NTIS HC $4.25

The one-dimensional reduction by projection method and the direct projection method are described insofar as their usefullness in solving linear systems. The theorems involved in the computations are given, and the problems are shown which were used to develop the projection methods. Author

N75-12681# Sandia Corp., Albuquerque, N.Mex.
COMPARISON OF SOME CODES FOR THE INITIAL VALUE PROBLEM FOR ORDINARY DIFFERENTIAL EQUATIONS
S. M. Davenport, L. F. Shampine, and H. A. Watts 1974 5 p refs Presented at the Conf. on Numerical Solutions of Boundary Probl. for Ordinary Differential Equations, Baltimore, 10 Jun. 1974 Sponsored by AEC
(SLA-74-5319; Conf-740623-1) Avail: NTIS HC $3.25

Several techniques are described for solving boundary value problems. Some preliminary results of a study are summarized comparing the performance of several first class general purpose codes for solving the initial value problem for non-stiff ordinary differential equations. Codes have been compared including three different implementations of the Adam's methods, an implementation of the Gragg-Bulirsch-Stoer rational extrapolation algorithm, and a Runge-Kutta-Fehlberg method. M.C.F.

N75-12682# Sandia Corp., Albuquerque, N.Mex.
DYNAMIC CONSTITUTIVE EQUATIONS
W. Herrmann 1974 25 p refs Presented at the 7th US Natl. Congr. of Appl. Mech. Meeting, Boulder, Colo., 3 Jun. 1974 Sponsored by AEC
(SLA-74-5438; Conf-740624-1) Avail: NTIS HC $3.25

Problems of rapid deformation of solid materials, involving stress wave propagation which occurs during impact loading, ballistic penetration, explosive loading, and intense pulsed radiation were explored. Attention was given to considerations in the formulation of material constitutive laws, particularly one constitutive formula which was found to be applicable to a wide variety of materials. Current work in progress in the laboratory to evaluate the constitutive functions by experimentation is described. Author

N75-12683# Sandia Labs., Livermore, Calif.
MODIFIED GRAM SCHMIDT ORTHOGONALIZATION AND

ITS APPLICATIONS, INCLUDING CONSTRAINED LEAST SQUARES APPROXIMATION
J. F. Lathrop and D. E. Amos Apr. 1974 37 p refs
(Contract AT(29-1)-789)
(SLL-74-200) Avail: NTIS HC $3.75

This report describes the modified orthogonalization procedure and a number of applications of this procedure. The applications discussed are the solution of systems of linear equations, least squares, least squares with equality constraints, least squares with inequality constraints, and the solution of systems of linear inequalities. Also described is a FORTRAN subroutine to perform the orthogonalization. NSA

N75-12684# Ames Lab., Iowa.
ALGORITHMS FOR PROJECTION METHODS FOR SOLVING LINEAR SYSTEMS OF EQUATIONS
R. L. Wainwright and R. F. Keller May 1974 144 p refs
(Contract W-7405-eng-82)
(IS-3397) Avail: NTIS HC $5.75

This paper develops a new projection method for any dimension which is equivalent to the conventional projection method. The new projection method requires less than half the arithmetic operations required by the old projection method per iteration step. In addition the number of operations per component per iterative step for the new method is shown to be independent of the dimension of the method used. Despite the additional overhead calculations required for the new projection method this study proves that the solution is obtained in fewer arithmetic operations than required by the conventional projection method. This is true for any initial vector, using any dimensional method, and for any nonsingular coefficient matrix. Hybrid projection methods are also developed. They are shown to require less than half the arithmetic operations of the conventional method per iterative step. Operations required per component per iterative step are independent of the dimension of the method used. NSA

N75-12685# Los Alamos Scientific Lab., N.Mex.
CREATION AND COMPARISON OF FINITE DIFFERENCE ANALOGS OF SOME FINITE ELEMENT SCHEMES
B. K. Swartz 1974 40 p refs Presented at Conf. on Mathematical Aspects of Finite Elements in Partial Differential Equations, Madison, Wisconsin, 1 Apr. 1974
(Contract W-7405-eng-36)
(LA-UR-74-771; Conf-740454-1) Avail: NTIS HC $3.75

The notion of the resolving power of approximation methods, i.e. the number of intervals (or function values) per wavelength necessary to attain a preassigned error when approximating a given frequency, permits the evaluation of the relative efficiency of three types of spatial differencing used in setting up differential-difference equations for the 1-periodic parabolic problem u sub t = u sub x. The three types of high order spatial schemes considered are centered differencing (explicit), the super-convergent spline-Galerkin schemes, and the very high order implicit schemes which generalize Numerov's method. Some corresponding results for the hyperbolic problem u sub t = u sub x are also reviewed, along with the tri-diagonal implicit difference formula which extends Numerov differencing to the general 2nd order linear differential operator in one space dimension. Author

N75-12686# Los Alamos Scientific Lab., N.Mex.
BELL TRANSFORM
C. J. Everett and E. D. Cashwell 1974 10 p refs Presented at Monte Carlo Conf., Argonne, Ill., 1 Jul. 1974
(Contract W-7405-eng-36)
(LA-UR-74-831; Conf-740710-1) Avail: NTIS HC $3.25

An exposition and extension is given of some work, involving the construction of a radially symmetric probability density in the plane which has a given marginal density. The problem is of importance in certain Monte Carlo procedures. While the results are more extensive and precise, the crucial step relies on a remarkable integral transform. NSA

N75-12687# Michigan Univ., Ann Arbor. Dept. of Aerospace Engineering.
MATHEMATICAL MODELLING AND IDENTIFICATION THEORY Interim Report, 1 Jun. 1973 - 31 May 1974
William L. Root 1974 8 p refs
(Grant AF-AFOSR-2328-72; AF Proj. 9749)
(AD-785425; AFOSR-74-1412TR) Avail: NTIS CSCL 12/1

This report is a brief summary of research accomplishments by the author and his associates resulting from their research in mathematical modelling and identification theory. It discusses their exposition of the basic theory of pseudo-inverses for linear operators in Hilbert space, including an extension to the case of closed linear operators that are not necessarily bounded or have closed range; related observations on a Gause-Markov theorem for Hilbert space and its application to identification using Volterra polynomials as a system model; and several other new results. It also discusses a new self-contained, consistent treatment of least squares and linear unbiased minimum-variance estimation and the initial results obtained on identification of time-varying systems, with emphasis on the slowly-varying class. (Modified author abstract) GRA

N75-12688# Lincoln Lab., Mass. Inst. of Tech., Lexington.
SOME TECHNIQUES FOR TESTING PSEUDO-RANDOM NUMBER SEQUENCES
James L. Mannos 21 Aug. 1974 38 p refs
(Contract F19628-73-C-0002; DA Proj. 7X2-63304-D-215)
(AD-785379; TN-1974-44; ESD-TR-74-244) Avail: NTIS CSCL 12/1

Statistical tests are presented which may be applied to any type of pseudo-random number generator to ascertain whether its statistics have certain desired properties. Possible pitfalls are discussed, along with a computer program to implement these tests. The program was applied to several types of uniformly-distributed generators, including the mixed-congruence, the exclusive-or-and-shift, and the CDC RANF generator. Each of these was found to exhibit statistical irregularities, indicating that care is necessary in the selection of a generator. A second computer program is described which tests the correlation between two pseudo-random number sequences. A practical example of its application provides insight into the generation of multiple sequences with a single generator. Author (GRA)

N75-12689# Technology Service Corp., Santa Monica, Calif.
TOPICS IN THE ANALYSIS AND OPTIMIZATION OF COMPLEX SYSTEMS Interim Report
William S. Meisel, David C. Collins, and Leo Breiman Jul. 1974 15 p refs
(Contract F44620-71-C-0093; AF Proj. 9749)
(AD-785415; AFOSR-74-1410TR) Avail: NTIS CSCL 12/1

The general thrust of the research is the development of approaches to improving the utility of computer-oriented quantitative methods in practical decision-making and system design. The research was directed at obtaining acceptable system models in two ways: (1) by repro-modeling (making a more efficient model of) a complex model based on physical processes; and (2) by developing empirical models based on limited measurements of the system. (Modified author abstract) GRA

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N75-12690*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
COMPUTER SIMULATION OF THE THRESHOLD SENSITIVITY DETERMINATIONS
J. B. Gayle Washington Dec. 1974 33 p refs
(NASA-TN-D-7663) Avail: NTIS HC $3.75 CSCL 12A

A computer simulation study was carried out to evaluate various methods for determining threshold stimulus levels for impact sensitivity tests. In addition, the influence of a number of variables (initial stimulus level, particular stimulus response curve, and increment size) on the apparent threshold values and on the corresponding population response levels was determined. Finally, a critical review of previous assumptions regarding the stimulus response curve for impact testing is presented in the light of the simulation results. Author

N75-12691# Army Material Command, Texarkana, Tex. Intern Training Center.
METHODS FOR THE DETERMINATION OF THE PROBABILITY DISTRIBUTION AND/OR THE PARAMETERS WHICH BEST DESCRIBE A SET OF TEST DATA Final Report
Robert J. Abernathy Apr. 1974 66 p refs
(AD-785497; USAMC-ITC-02-08-73-008) Avail: NTIS CSCL 12/1

The purpose of this research is to analyze the methods for fitting standard probability density functions to test data. A logical method of combining the available techniques is then developed to offer a systematic data analysis procedure. The basic analysis techniques analyzed are the ones relating to the continuous density functions most often used in the fields of reliability and maintainability. Methods for fitting data investigated include the classical graphical techniques and the analytical methods of parameter estimation. Also, a wide range of useful computer applications is investigated. Two very useful tables, one a table of applications of statistical distributions and the other a table of maximum likelihood estimates, are included and serve as a quick reference. Author (GRA)

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

No abstracts in this category.

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

N75-12692# Illinois Univ., Chicago. Dept. of Information Engineering.
TIME SERIES MODEL FOR TEXTURE SYNTHESIS
B. H. McCormick and S. N. Jayaramamurthy 1974 29 p refs (Contract AT(11-1)-2118)
(TID-26599) Avail: NTIS HC $3.75

A general method is proposed for the synthesis of texture which is based on a model which treats the pixels (picture elements) of a digitized textural scene as a two-way seasonal time series. This method possesses the desirable characteristic that the parameters needed for synthesis are derived directly from the analysis of the 'parent' texture (texture to be imitated). Well developed methods in the time series analysis allow the process that generates the pixels of the parent texture to be identified. The future values of the time series are generated from a set of boundary conditions which in essence are the pixels of the synthesized texture. The effectiveness of this method is illustrated with examples. Author

N75-12693# Columbia Univ., New York. Dept. of Physics.
DUAL TREES AND RESUMMATION THEOREMS
R. Friedberg 1974 48 p refs Sponsored by AEC
(COO-2271-28) Avail: NTIS HC $3.75

Various resummation theorems known for graphical expansions in statistical physics and field theory are exhibited as special cases of a single symmetrical, easily remembered theorem on a generalized structure called a dual tree. Author (NSA)

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

N75-12694*# Rice Univ., Houston, Tex. Dept. of Electrical Engineering.
TRANSIENT AND STEADY-STATE VELOCITY OF DOMAIN WALLS FOR A COMPLETE RANGE OF DRIVE FIELDS
Henry C. Bourne, Jr. and David S. Bartran [1974] 13 p refs Prepared in cooperation with Honeywell, Inc., Oklahoma City, Okla.
(Grants NGR-44-006-001; NSF GH-34584)
(NASA-CR-140942) Avail: NTIS HC $3.25 CSCL 20C

Approximate analytic solutions for transient and steady-state 180 deg domain wall motion in bulk magnetic material are obtained from the dynamic torque equations with a Gilbert damping term. The results for the Walker region in which the transient solution approaches the familiar Walker steady-state solution are presented in a slightly new form for completeness. An analytic solution corresponding to larger drive fields predicts an oscillatory motion with an average value which decreases with drive field for reasonable values of the damping parameter. These results agree with those obtained by a computer solution of the torque equation and those obtained with the assumption of a very large anisotropy field. Author

N75-12695# Technical Research Centre of Finland, Helsinki.
[TECHNOLOGY AND COMMUNITY DEVELOPMENT MATERIALS PROCESSING, AND ELECTRICAL AND NUCLEAR TECHNOLOGY]
1973 84 p refs Original contains color illustrations
Avail: NTIS HC $4.75

Activities of the Technical Research Center of Finland are discussed. Community development, materials and processing, and electrical and nuclear technologies are reported. It is shown that the information service assists the activity units of the Center and this information is available to other research organizations. M.C.F.

N75-12696# Communications Research Centre, Ottawa (Ontario).
PROCEEDINGS OF THE CANADIAN WORKSHOP ON ACOUSTIC SURFACE WAVES
D. B. Wohlberg and G. W. Farnell Jun. 1974 58 p Workshop held at Ottawa, 30-31 Jan. 1974
(CRC-1260) Avail: NTIS HC $4.25

The assessment of needs and capabilities, and directions for future activity constituted the scope of technical presentations on surface acoustic waves which are a major factor in communications research. For individual titles, see N75-12697 through N75-12703.

N75-12697 Communications Research Centre, Ottawa (Ontario).
INTRODUCTION TO THE PROCEEDINGS OF THE CANADIAN WORKSHOP ON ACOUSTIC SURFACE WAVES
D. B. Wohlberg and G. W. Farnell *In its* Proc. of the Can. Workshop on Acoustic Surface Waves Jun. 1974 13 p (For availability see N75-12696 03-70)

The invited tutorial presentations, which ranged in subject matter from materials and basic physics to systems applications in communications and radar, are summarized. It is concluded that there exists in Canada sufficient interest, needs, and capabilities to support a moderate level of acoustic surface wave research, development, and manufacturing activity. Author

N75-12698 RCA Research Labs., Sainte Anne de Bellevue (Quebec).
INTERDIGITAL TRANSDUCERS AND ACOUSTIC-SURFACE-WAVE FILTERS **c33**
D. H. Hurlburt *In* Commun. Res. Centre Proc. of the Can. Workshop on Acoustic Surface Waves Jun. 1974 5 p (For availability see N75-12696 03-70)

Problems in the design of surface acoustic wave devices were identified as phase-front distortion, internal reflections, and triple-transit signals. The methods for correcting these problems are illustrated, and it is concluded that the design of surface wave filters is based on the relationship between the interdigital transducer and its corresponding time response. A.A.D.

N75-12699 Toronto Univ. (Ontario). Dept. of Electrical Engineering.
FABRICATION TECHNOLOGY AND MATERIALS **c76**
V. M. Ristic *In* Commun. Res. Centre Proc. of the Can. Workshop on Acoustic Surface Waves Jun. 1974 3 p (For availability see N75-12696 03-70)

The characteristics of three lithographic methods presently used for fabrication of surface acoustic wave (SAW) devices are discussed, along with three types of materials considered suitable for incorporation with SAW technology: single crystals; thin piezoelectric film deposited on a nonpiezoelectric substrate; and piezoelectric ceramics. A.A.D.

N75-12700 Communications Research Centre, Ottawa (Ontario).
SYSTEMS APPLICATIONS AND IMPLEMENTATION 1: COMMUNICATIONS **c32**
D. B. Wohlberg *In its* Proc. of the Can. Workshop on Acoustic Surface Waves Jun. 1974 11 p (For availability see N75-12696 03-70)

Several surface acoustic wave (SAW) devices of interest in the field of communications research are listed along with salient features and some possible applications. The use of SAW devices in spread-spectrum communication systems is considered in terms of size, cost, reliability operational use, and security tradeoffs. A.A.D.

N75-12701 Communications Research Centre, Ottawa (Ontario).
SYSTEMS APPLICATIONS AND IMPLEMENTATION 2: RADAR **c32**
S. M. Chow *In its* Proc. of the Can. Workshop on Acoustic Surface Waves Jun. 1974 8 p (For availability see N75-12696 03-70)

Surface acoustic wave (SAW) technology is described in terms of its utility in pulse compression radar systems which make use of a processing technique called matched filtering which, in the past, required complex and costly circuits. SAW technology allows pulse compression systems to extend the range of radar under peak power constraint without sacrificing resolution capability. A.A.D.

N75-12702 McGill Univ., Montreal (Quebec). Dept. of Electrical Engineering.
NONLINEAR EFFECTS: AMPLIFIERS AND CONVOLVERS **c33**
E. L. Adler *In* Commun. Res. Centre Proc. of the Can. Workshop on Acoustic Surface Waves Jun. 1974 8 p (For availability see N75-12696 03-70)

The sources of nonlinearity are identified as coming from the quadratic terms in the constitutive equations of materials, and the space-charge nonlinearity as being due to coupling to free carriers. Nonlinearity produces intermodulation distortion and harmonic generation limits the dynamic range of a surface-wave device, however, nonlinearities are advantageous in the design of signal processors such as convolvers and correlators for the amplification of surface waves either by parametric or electronic means. The presentation is divided into three parts each dealing with the present experimental situation. The first part deals with amplification of surface waves, the second part with harmonic-generation experiments, and the third part with convolver and correlator devices. Author

N75-12703 Toronto Univ. (Ontario). Dept. of Physics.
OPTICAL PROBING OF SURFACE WAVES **c74**
G. I. A. Stegeman *In* Commun. Res. Centre Proc. of the Can. Workshop on Acoustic Surface Waves Jun. 1974 5 p (For availability see N75-12696 03-70)

Direct information about the spectrum of acoustic modes excited in a surface acoustic wave device is possible through the technique of optical probing. Typical measurements pertinent to surface acoustic wave technology are presented in order to establish the feasibility of such diagnostic experiments. A.A.D.

N75-12704# Research Inst. of National Defence, Stockholm (Sweden).
AN EXPERIMENTAL STUDY OF COUPLING EFFECTS IN A PLANAR ARRAY ANTENNA [EXPERIMENTAL STUDIE AV KOPPLINGSEFFEKTERI EN PLAN GRUPPANTENN]
Hans Steyskal Nov. 1972 30 p refs In SWEDISH
(FOA-3-C-3728-E2) Avail: NTIS HC $3.75

The coupling effects in a planar array antenna of 127 elements are measured at different frequencies and polarizations and then used for calculating the active reflection factor. It is shown that coupling coefficients follow the asymptotic angle and dependence on distance for element distances greater than 4 lambda where lambda represents the wave length. The pattern of measurements is not enough for a complete reproduction of the coupling relationship in an infinite array antenna but does permit a reasonable estimate of the antenna element's characteristics. The selected elements (circular dielectric filled wave guides in a ground plane) and variable distance allow an acceptable impedance adaptation for directions of radiation within a 90 deg. cone, 10% band width and variable polarization. Author

N75-12705# Research Inst. of National Defence, Stockholm (Sweden).
THE WORK OF THE INSTITUTION FOR RADIO WAVE PROPAGATION (INSTITUTION 345) [VERKSAMHETEN VID INSTITUTIONEN FOER RADIOVAGUTBREDNING (INSTITUTION 345)]
F. Eklund, A. Blomquist, R. Lindquist, W. Stoffregen, and S. Wickerts Nov. 1972 42 p refs In SWEDISH
(FOA-3-C-3726-E8) Avail: NTIS HC $3.75

The scientific field of responsibility is outlined. The first main section deals with the effect of the earth surface on the propagation of radio waves; the second covers the effect of the troposphere, including that of cloud, mist and rainfall with emission of radio radiation from the atmosphere and land surface, the third deals with the effect of the ionosphere; and the fourth covers noise and interference (excluding thermal noise) in the short wave range. Author

N75-12706# Materials Research Labs., Maribyrnong (Australia).
CALIBRATION OF A 1 TO 10kg SET OF MASSES
D. B. Prowse Sep. 1974 18 p refs
(TN-352) Avail: NTIS HC $3.25

The theoretical aspect of designing a calibration scheme for a set of mass standards is considered and applied to the calibration of a set of masses in the range 1 to 10 kg. The masses are calibrated in terms of combinations of five 1-kg masses and so the actual calibration scheme presented does not have general applicability. The method of comparing the five 1-kg masses in terms of a 1-kg standard known to 1.5 in 10 to the 7th power is also given. An assessment is included of the accuracy of mass standards at MRL. Author

N75-12707# Commissariat a l'Energie Atomique, Grenoble (France).
APPLICATION OF STABLE NITROXIDE FREE RADICALS IN SOLUTION TO LOW MAGNETIC FIELD MEASUREMENTS Ph.D. Thesis - Grenoble Univ.
R. Besson Feb. 1974 104 p refs In FRENCH
(CEA-R-4540) Avail: AEC Depository Libraries HC $5.25

The application of stable nitroxide free radicals to the development of an operational magnetometer is reported, the magnetometer has the following qualities: ability to function at temperatures from -40 to 75 C on a standard scale, produce nuclear signals sufficient for correct oscillation, and have its axis oriented in the terrestrial magnetic field. Limits of the magnetometer are also discussed. Transl. by E.H.W.

N75-12708# Cornell Univ., Ithaca, N.Y.
FAR INFRARED ABSORPTION IN SMALL METALLIC PARTICLES
D. B. Tanner and R. A. Buhrman Apr. 1974 41 p refs Sponsored by AEC
(COO-3151-38) Avail: NTIS HC $3.75

Far infrared transmission measurements were made on powder samples of Cu, Al, Sn and Pb. The diameter of the particles ranged from 65A to 350A. All of the samples showed absorption which was very small at low frequencies and which increased more or less linearly as the frequency increased. There was no change in the absorption as the temperature was varied from 1.2K to 20K. For the smaller particles absorption curves calculated from the modified theory of Gor'kov and Eliashberg give a good description of the data, although clear choices between different energy level ensembles cannot be made. Our measurements provide direct evidence that for superconducting particles of diameter approximately 100A and mean energy level spacing approximately kT sub c the energy gap structure in the density of states is either much attenuated or is completely absent. NSA

N75-12709# Naval Postgraduate School, Monterey, Calif.
ANALYSIS OF BALLISTIC CALIBRATION DATA AND GOVERNMENT/CONTRACTOR CEP TEST DATA WITH RESPECT TO THE AN/TPQ-27 CONTRACT INCENTIVE FEE DETERMINATION Final Report, Sep. - Dec. 1973
Thomas D. Burnett Mar. 1974 42 p refs
(AD-781373; NPS-55ZA74031) Avail: NTIS CSCL 19/5

The adequacy and appropriateness are analyzed of the methods and analytical techniques used by NWL, Dahlgren, Va., in establishing the ballistic characteristic of the Practice Bomb Mark 76 with lug on the basis of October/November 1972 test drops. Test results are analyzed with respect to potential system errors which could lead to observed bomb range discrepancies. On the basis of these analyses it is concluded that the source of the bomb range discrepancy is not associated with the ballistic calibration but with the AN/TPQ-27 system. Possible sources of system errors are identified. Author (GRA)

N75-12710# California Univ., Riverside. Dept. of Physics.
TRANSPORT OPTICAL AND MAGNETIC PROPERTIES OF SOLIDS Final Report
R. L Wild and E. Simanek Aug. 1974 15 p refs
(Grant AF-AFOSR-2077-71; AF Proj. 9763; AF Proj. 6813)
(AD-785429; AFOSR-74-1378TR) Avail: NTIS CSCL 20/12

This grant was for a combined experimental-theoretical study of basic electron interaction in insulators, semi-conductors and metals. The experimental work covered two general areas, one of a study of the thermal treatment on the optical and electrical response of the perovskite oxides. SrTiO3, in particular, was found to be a most interesting and complicated system, where the initial characterization of the material is of utmost importance. Much of the basic work on SrTiO3 may not be valid because of inadequate knowledge of the thermal history. The other experimental area concerns the low temperature exchange reaction and the effect on the specific heat of magnetic glass systems and rare earth chalcogenides. The theoretical studies were on critical fluctuations near phase transitions and on electron-phonon interactions in metals and magnetic interactions in solids. (Modified author abstract) GRA

N75-12711# Naval Research Lab., Washington, D.C.
SOLAR-GEOPHYSICAL EFFECTS ON NORTHERN AND MID-LATITUDE ELF PROPAGATION Interim Report
John R. Davis and William D. Meyers 12 Jul. 1974 26 p refs
(NRL Proj. R07-23)
(AD-785011; NRL-7771) Avail: NTIS CSCL 20/14

The ionospheric phenomena that have the greatest effect on ELF propagation occur at middle to northern latitudes under conditions of path darkness. Polar cap events cause increased ion densities in the polar lower D region, these events can lead to greatly increased absorption of northern latitude paths. Under nighttime conditions, precipitated electrons can affect transmitting and receiving stations in the auroral zone by enhancing the conductivity of the lower E region. Precipitation of charged particles trapped in the outer radiation belt can affect stations and paths at even lower latitudes. Examples of ELF propagation data under disturbed conditions are rare, but the few that have been recorded in recent years show significant correlation with solar proton flux emissions, galactic cosmic ray fluctuations, auroral and polar cap absorption events, and geomagnetic storms. These correlations permit a preliminary, qualitative confirmation of the effects that solar charged particle emissions were expected to have on ELF propagation. Author (GRA)

N75-12712# Army Electronics Command, Fort Monmouth, N.J.
TRANSVERSE PROPAGATION CONSTANTS IN DIELECTRIC WAVEGUIDES
Kenneth L. Klohn, John F. Armata, Jr., and Metro M. Chrepta Aug. 1974 28 p
(DA Proj. 1S7-62705-AH-94)
(AD-785512; ECOM-4242) Avail: NTIS CSCL 09/1

Dielectric waveguides have been proposed as a transmission medium at optical and millimeter wave frequencies. In each case, calculations of the transverse propagation constants were carried out based on simplifying assumptions which allowed a closed form solution to basic transcendental equations. In this report, exact calculations of the transverse propagation constants were made for silicon waveguides having various aspect ratios by solving the transcendental equations on a programmed calculator. No simplifying assumptions were made. The results were used to compute guide wavelengths, and the values were compared to the values obtained experimentally and to those calculated using approximate formulas. The validity of the approximations and the conditions and circumstances in which it is appropriate to use them are discussed. Author (GRA)

N75-12713# Yale Univ., New Haven, Conn. Dept. of Engineering and Applied Science.
MOMENT CHARACTERIZATION OF A DOUBLY-SPREAD SURFACE SCATTER CHANNEL AT HIGH AND LOW RAYLEIGH PARAMETERS
F. B. Tuteur and J. F. McDonald Aug. 1974 40 p refs
(Contract N00014-67-A-0097-0031)
(AD-785286; TR-CS-3) Avail: NTIS CSCL 20/14

Many communication channels involving distortion due to random, time-variable surface scattering suffer from extremely acute time and frequency smear. This is particularly true for sonar propagation where Fresnel zones can be large and yet where Rayleigh parameters can also be quite high. Using a simple Fresnel corrected geometric optics model for the surface scatter channel it is possible to explain the unusually high degree of dispersive scattering observed. The scattering function for this channel is derived for an assumed Gaussian surface and several surface correlation-function models. Analyses are performed both for very large and very small Rayleigh parameters. (Modified author abstract) GRA

N75-12714# Rice Univ., Houston, Tex.
ULF MEASUREMENTS Final Report, 5 Sep. 1973 - 29 Feb. 1974
David L. Reasoner 20 Aug. 1974 58 p refs
(Contract DAAH01-74-C-0131)
(AD-785482) Avail: NTIS CSCL 20/14

The report describes the results of an experiment to investigate the possibility of artificially stimulating ultra-low-frequency (ULF) signals in the earth's magnetosphere by means of signals from a very-low-frequency (VLF) transmitter. A VLF transmitter system was operated near Anchorage, Alaska, in August and September, 1973. The investigator operated a low-frequency (0.1 - 45 Hz) portable magnetometer station at a site adjacent to the VLF transmitter, and also designed a schedule of modulation modes and transmission frequencies for the VLF transmitter in an effort to cause stimulation of ULF signals which would in turn be detected by the magnetometer. GRA

N75-12715# Naval Research Lab., Washington, D.C.
EVALUATING THE HELMHOLTZ INTEGRAL. PART 1: BASIC THEORY Interim Report
William B. Gordon 21 Aug. 1971 15 p refs
(NRL Proj. R02-88; XF21232015)
(AD-785013; NRL-7792-Pt-1) Avail: NTIS CSCL 20/14

In the Kirchhoff theory of physical optics the field scattered by a reflecting surface is represented by a Helmholtz integral, which is a certain double integral evaluated over the surface. New results are presented which show how the Helmholtz integral has a closed form representation as a line integral evaluated over the boundary of the surface. Also, in the standard far-field approximation to the Helmholtz integral, the scattered field can be represented in a form which does not involve any integrations at all. These results are very attractive from the standpoint of economy of calculation and appear to be well suited to the problem of estimating the field scattered by a large number of metallic plates, especially when the effects of multiple scatterings are of concern. Author (GRA)

N75-12047 Societe Nationale Industrielle Aerospatiale, Paris (France). Div. des Systemes Balistiques et Spatiaux.
FOUCAULT CURRENT DAMPING TESTS [ESSAIS RELATIFS AUX SYSTEMES D'AMORTISSEMENT PAR COURANTS DE FOUCAULT]
In its Design and Develop. of a Momentum Wheel with a Mainly Passive Magnetic Bearing, Phase 1, Vol. 2 31 May 1974 13 p In FRENCH (For availability see N75-12041 03-18)

N75-12049 Societe Nationale Industrielle Aerospatiale, Paris (France). Div. des Systemes Balistiques et Spatiaux.
TESTS ON AXIAL VELOCITY SENSOR [ESSAIS D'UN CAPTEUR DE VITESSE AXIALE]
In its Design and Develop. of a Momentum Wheel with a Mainly Passive Magnetic Bearing, Phase 1, Vol. 2 31 May 1974 4 p In FRENCH (For availability see N75-12041 03-18)

71 ACOUSTICS

Includes sound generation, transmission and attenuation.

For noise pollution see *45 Environment Pollution*.

No abstracts in this category.

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N75-12716# Research Inst. of National Defence, Stockholm (Sweden).
A HIGH INTENSITY FLASH X-RAY TUBE
Arne Mattsson Nov. 1972 15 p refs
(FOA-2-C-2580-E8) Avail: NTIS HC $3.25

The characteristics of a continuously evacuated transmission anode flash X-ray tube have been studied in the voltage range 250 kV-600 kV. Tube current, dose, pulse length and spatial distribution of the emitted radiation were studied. Typical values of the dose 0.5 m from the exit window and the pulse length are 115 mR and 20 ns respectively. Author

N75-12717# Sandia Labs., Albuquerque, N.Mex.
EFFECTS OF IONIZING RADIATION ON DIFFUSED RESISTORS
J. G. Fossum, H. H. Sander, and H. J. Gerwin Jul. 1974 24 p refs Presented at Ann. Conf. on Nucl. and Space Radiation Effects, Ft. Collins, Colo., 15 Jul. 1974
(Contract AT(29-1)-789)
(SLA-74-5148; Conf-740707-8) Avail: NTIS HC $3.25

A theoretical examination of the effects of ionizing radiation on diffused resistors performed to ascertain the feasibility of their use in hardened dielectrically isolated integrated circuits is described. The two basic effects-conductivity modulation, which is generally insignificant or can easily be rendered so, and photocurrent generation, the consequences of which essentially determine the diffused resistor hardness-are studied. Results indicate that typical diffused resistors are quite invulnerable to ionizing radiation. Design guidelines to achieve optimum hardness are implied. Initial findings of radiation experiments performed on a diffused resistor test chip are reported. When transient leakage dissociated with the resistor structures is accounted for, the results substantiate the primary conclusions of the theoretical study. Author (NSA)

N75-12718# Stanford Research Inst., Menlo Park, Calif.
DYNAMIC MOLECULAR DEFLECTION Final Report
R. M. Hill and T. F. Gallagher 19 Jul. 1974 45 p refs
(Contract F44620-71-C-0089; SRI Proj. PYU-1301)
(AD-785407; SRI-MP74-31; AFOSR-74-1380TR) Avail: NTIS CSCL 07/4

An experiment that tests a novel method for deflecting molecular beams using inhomogeneous resonance fields is described. If an electric field rotates at the same frequency as a molecule placed in it, the field and molecule remain aligned and the dipole moment-electric field interaction does not average to zero. If the field is spatially inhomogeneous then there is a net force on the molecule. This force can be used in making a molecular beam deflector. Resonance deflection of molecules in the J = 0 and 1 rotational states of a molecular beam of CsF has been observed. The deflection is produced by passing a collimated molecular beam of CsF through the center of a TE(111) microwave cavity which is oscillating at the J = 01 transition frequency, 11.019 GHz. The theory of the effect as well as potential applications are also discussed. (Modified author abstract) GRA

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation*.

N75-12719# Joint Publications Research Service, Arlington, Va.
PEACEFUL NUCLEAR EXPLOSIONS AND THE ENVIRONMENT
Yu. A. Izrael 22 Nov. 1974 144 p refs Transl. into ENGLISH of the book "Mirnyye Yadernyye Vzryvy i Okruzhayushchaya Sreda" Gidrometeoizdat, 21 Jun. 1974 135 p Leningrad,
(JPRS-63502) Avail: NTIS HC $5.75

Applications of the peaceful uses of underground nuclear explosions are presented. Radioactive contamination of the environment associated with nuclear explosions is examined. Conclusions indicate that radiation safety must be considered for effective environmental protection in the peaceful applications of nuclear explosions. J.M.S.

N75-12720# Rome Univ. (Italy).
PROFILE AND CONTAMINATION OF AN ELECTRON BEAM
G. Romano 15 Mar. 1974 8 p refs
(NP-20054) Avail: AEC Depository Libraries HC $4.00

The use of dielectric track detectors for beam monitoring at the Frascati electron synchrotron is described. Nitrocellulose sheets were used to measure the electron beam profile and to measure the gamma-ray contamination in the beam. NSA

N75-12721# Oak Ridge National Lab., Tenn.
ESTIMATED QUANTITIES OF MATERIALS CONTAINED IN A 1000-MW(e) PWR POWER PLANT
R. H. Bryan and I. T. Dudley Jun. 1974 51 p refs
(Contract W-7405-eng-26)
(ORNL-TM-4515) Avail: NTIS HC $3.75

The quantities of materials contained in a typical 1000-MW(e) pressurized water reactor power plant have been estimated in detail. Reference plant features, methods used in making the estimate, accuracy of the estimates, and accounting system are discussed. Estimated quantities of the composite materials and their constituents are summarized and are also presented in detail for each portion of the power plant. Author (NSA)

N75-12722# Gosudarstvennyi Komitet po Ispolzovaniyu Atomnoi Energii, Moscow (USSR).
SHORT DESCRIPTION OF THE THERMONUCLEAR FACILITIES OF THE I. V. KURCHATOV INSTITUTE FOR NUCLEAR ENERGY
M. K. Romanov, ed. May 1974 30 p Transl. into ENGLISH from the Russian report IAE-2314 Sponsored by AEC Prepared for Argonne Natl. Lab.
(ANL-Trans-952; IAE-2314) Avail: NTIS HC $3.75

Short descriptions are given for 28 facilities at the Institute. Technical characteristics and some results from each experiment are given. NSA

N75-12723# Atomic Energy Commission, Washington, D.C.
NUCLEAR POWER GROWTH, 1974 - 2000
Feb. 1974 78 p
(WASH-1139-74) Avail: NTIS HC $4.75

Domestic and foreign trends in the growth of nuclear power are evaluated. The future capability of foreign nations to supply uranium enrichment service to reactor operators, the timing and application of plutonium recycle technology, and the timing and rate of introduction of the fast-breeder reactor are discussed. A

total of seven separate cases was prepared. These cases provide a reasonable range of estimates of the growth of nuclear power and the concomitant range of requirements for separative work, uranium and related materials and services. Forecasts for the next decade are based on an analysis and evaluation of nuclear plants already operating, those under construction, and those planned. Forecasts beyond this period are based on extrapolations of near-term growth trends together with differing assumptions about future trends in energy consumption and electricity generating capacity. Author (NSA)

N75-12724# Atomic Energy Commission, Washington, D.C. Directorate of Licensing.

COMPILATION OF OCCUPATIONAL RADIATION EXPOSURE FROM LIGHT WATER COOLED NUCLEAR POWER PLANTS, 1969 - 1973

T. D. Murphy May 1974 13 p refs
(WASH-1311) Avail: NTIS HC $3.25

A compilation of occupational radiation exposures at light water cooled commercial power plants for the years 1969 through 1973 is presented. The data included are those reported by licensees except for certain calculations made by the staff. The report shows that while the average individual exposure remains low (one rem per year) in comparison with the limits set forth in the Atomic Energy Commission's part 20 of Title 10, Chapter 1, Code of Federal Regulations (10 CFR Part 20), Standards for Protection Against Radiation, the average exposure per plant (the cumulative exposure for all personnel at a plant) has increased from 1969 to 1973. Author (NSA)

N75-12725# California Univ., Livermore. Lawrence Livermore Lab.

SPACE CHARGE LIMITING OF BOUNDED RELATIVISTIC ELECTRON BEAMS

T. J. Fessenden 30 May 1974 15 p refs
(Contract W-7405-eng-48)
(UCID-16527) Avail: NTIS HC $3.25

It is assumed that because of a sufficiently strong axial magnetic field, the electrons are constrained to move only in the direction of beam propagation. It is assumed that the charge density of the beam is uniform and that the beam is inside a conducting pipe. With these hypotheses, Poisson's equation is then solved. The following cases are considered: (1) uniformly filled pipe, (2) thin beam limit, and (3) for arbitrary ratios of beam to pipe radius. NSA

N75-12726# California Univ., Livermore. Lawrence Livermore Lab.

PARTICLE REGISTRATION IN DIELECTRIC MATERIALS: A BIBLIOGRAPHY

R. V. Griffith 9 Apr. 1974 183 p refs
(Contract W-7405-eng-48)
(UCRL-51568) Avail: NTIS HC $7.00

A bibliography containing 872 references on techniques and applications of registration of nuclear particles in dielectric materials, as well as 30 track registration patents, has been compiled with cross-reference lists by author and key word. About two-thirds of the reference include abstracts. Author (NSA)

N75-12727# Oak Ridge National Lab., Tenn.

EFFECT OF CHARGE EXCHANGE REACTIONS ON NEOCLASSICAL TRANSPORT

D. J. Sigmar and J. F. Clarke Jun. 1974 35 p refs
(Contract W-7405-eng-26)
(ORNL-TM-4606) Avail: NTIS HC $3.75

A collision operator for the reaction H(+)(hot) + H(0)(cold) yields H(0)(hot) + H(+)(cold) is derived from the Boltzmann integral and incorporated in the proton drift kinetic equation for a toroidally confined plasma in the banana regime. In addition to the proton diffusion, the relaxation of the radial electric field and the parallel flow velocity is calculated and shown to occur in a few charge exchange times, much faster then via perpendicular ion viscosity. Author (NSA)

N75-12728# Max-Planck-Institut fuer Plasmaphysik, Garching (West Germany).

TRITIUM ECONOMY AND TRITIUM SAFETY OF FUSION POWER PLANTS

W. Daenner Jan. 1974 59 p refs
(IPP-4/112) Avail: AEC Depository Libraries HC $6.00

The inter-relationships between the quantities governing questions of economy are outlined. The application of diffusion forced tritium removal methods is discussed. Two different solutions are investigated: tritium extraction from the secondary circuit and inside a bypass of the main string of the primary loop of a fusion reactor power conversion system. Six possible types of thermal power cycles are investigated. Special effort was devoted to the bypass solution, which offers some advantages in the way of system independence, flexibility, and safety. A method of optimizing such a device is described. In order to demonstrate this procedure, a number of numerical calculations were performed, the results of which are presented in a series of tables. Author (NSA)

N75-12729# Los Alamos Scientific Lab., N.Mex.

BURN CHARACTERISTICS OF MARGINAL DEUTERIUM-TRITIUM MICROSPHERES

D. B. Henderson May 1974 5 p refs
(Contract W-7405-eng-36)
(LA-5603-MS) Avail: NTIS HC $3.25

Existing studies of the thermonuclear burn of DT microspheres have assumed complete Maxwellian distributions. Under marginal conditions, long mean-free-paths for ions in the tail of the distribution may quench the burn. This mission factor appears to explain the lack of success in laser-fusion experiments conducted to date. Author (NSA)

N75-12730# Oak Ridge National Lab., Tenn.

ORNL ISOTOPIC POWER FUELS Quarterly Report, period ending 31 Mar. 1974

C. L. Ottinger Jun. 1974 38 p refs
(Contract W-7405-eng-26)
(ORNL-4978) Avail: NTIS HC $3.75

Examination of the 49 compatibility test couples which were taken off test in December 1973 was started. Nonradioactive control couples representative of these 49 specimens were examined. Development of the techniques required for fabrication of the 11 couple combined compatibility/tensile strength test matrix continued. Free energy calculations were made covering possible reactions of (Cm-244)2O3 fuel with six potential encapsulants. Helium release experiments at 500, 650, and 800C were completed. These tests indicated that the controlling mechanism for helium release from (Cm-244)2O3 is different at different temperatures, with a change in mechanism occurring in the region of from 600 to 700C. Vapor pressure measurements were made on (Cm-244)2O3. A 25-W (Cm-244)2O3 pellet was exposed to dry air; it exhibited a similar edge-fracturing effect as that observed in a previous test. A leach rate study was done on a sample of air-oxidized (Cm-244)2O3 fuel. Author (NSA)

N75-12731# Catholic Univ. of America, Washington, D.C.

EXPERIMENTAL DETERMINATION OF COUNTERCURRENT TWO-PHASE FLOW OF WATER Ph.D. Thesis

D. F. Ross, Jr. 1974 177 p refs
(Contract AT(40-1)-4348)
(ORO-4348-1) Avail: NTIS HC $7.00

Loss of coolant accidents of light water cooled nuclear reactors are analyzed. Cold liquid water is injected into an upflowing vapor, with the purpose of penetrating the vapor and restoring coolant to the reactor core. The steam water interaction can cause the injected coolant to be entrained. Experimental determinations of the steam water interaction are reported. Steam flow rates, pressure, and liquid flow rates are given. Void fraction was measured with a gamma densitometer. Drop diameters and velocities were measured from high speed motion pictures. Entrainment rates were measured by collecting the liquid at the top and bottom of the test section, after separating the vapor. The results showed that entrainment could be correlated with the effective momentum flux p bar V 2 sub g, where p bar takes into account the moisture level in the flowing core. Author (NSA)

74 OPTICS

Includes light phenomena.

N75-12732* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
METHOD OF FORMING APERTURE PLATE FOR ELECTRON MICROSCOPE Patent
Klaus Heinemann, inventor (to NASA) (NAS-NRC) Issued 12 Nov. 1974 6 p Filed 28 Jun. 1973 Supersedes N74-12190 (12 - 03, p 0293) Continuation-in-part of abandoned US Patent Appl. SN-221670, filed 28 Jan. 1972 Sponsored by NASA
(NASA-Case-ARC-10448-2; US-Patent-3,847,689; US-Patent-Appl-SN-374424; US-Patent-Class-156-7; US-Patent-Class-156-16; US-Patent-Class-156-18; US-Patent-Class-250-495) Avail: US Patent Office CSCL 20F

An electron microscope is described with an electron source a condenser lens having either a circular aperture for focusing a solid cone of electrons onto a specimen or an annular aperture for focusing a hollow cone of electrons onto the specimen. It also has objective lens with an annular objective aperture, for focusing electrons passing through the specimen onto an image plane. A method of making the annular objective aperture using electron imaging, electrolytic deposition and ion etching techniques is included. Official Gazette of the U.S. Patent Office

N75-12733 British Broadcasting Corp., Kingswood (England). Research Dept.
COLOUR TELEVISION DISPLAYS: ERROR DIAGRAMS FOR EVALUATING THE REPRODUCED CHROMATICITIES OF SOME TEST COLOURS
E. W. Taylor Oct. 1974 66 p refs
(BBC-RD-1974/34) Avail: BBC, Kingswood Warren, Tadworth, Surrey, England

Diagrams are provided in order to determine the errors in the reproduction of 17 test colors. This reproduction is effected by a color television display in which one or more phosphors have chromaticities differing from the specified 625-line System 1 values. The error in test color reproduction is represented by the vector sum of three errors based on the individual effect of each display phosphor. The accuracy of the method is statistically assessed. The results show that the test-color chromaticity coordinate values have a tolerance of approximately 13% of the scalar sum of the errors found for the individual phosphors. Author

N75-12734*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
BOUNDARY AND OBJECT DETECTION IN REAL WORLD IMAGES
Yoram Yakimovsky 15 Nov. 1974 30 p refs
(Contract NAS7-100)
(NASA-CR-140828; JPL-TM-33-709) Avail: NTIS HC $3.75 CSCL 20F

A solution to the problem of automatic location of objects in digital pictures by computer is presented. A self-scaling local edge detector which can be applied in parallel on a picture is described. Clustering algorithms and boundary following algorithms which are sequential in nature process the edge data to locate images of objects. Author

N75-12735* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
TELESCOPE SYSTEMS FOR BALLOON-BORNE RESEARCH
Charles Swift, ed., Fred C. Witteborn, ed., and Alfred Shipley, ed. Nov. 1974 330 p refs Conf. held at Moffett Field, Calif., 21-22 Feb. 1974; sponsored by Natl. Center for Atmos. Res.
(NASA-TM-X-62397) Avail: NTIS HC $9.50 CSCL 20F

The proceedings of a conference on the use of balloons for scientific research are presented. The subjects discussed include the following: (1) astronomical observations with balloon-borne telescopes, (2) orientable, stabilized balloon-borne gondola for around-the-world flights, (3) ultraviolet stellar spectrophotometry from a balloon platform, (4) infrared telescope for balloon-borne infrared astronomy, and (5) stabilization, pointing, and command control of balloon-borne telescopes. For individual titles, see N75-12736 through N75-12763.

N75-12736* Massachusetts Univ., Amherst. Astronomy Research Facility.
BALLOON-BORNE INFRARED CORONAGRAPH c35
John Strong *In* NASA. Ames Res. Center Telescope Systems for Balloon-Borne Res. Nov. 1974 p 1-6 refs (For availability see N75-12735 03-74)
CSCL 20F

The use of balloon vehicles to observe the solar corona with an infrared coronagraph is reviewed. The scientific results and the instruments employed are discussed. A parallel is drawn between the required functions of a coronagraph and of a far-infrared cold telescope. Author

N75-12737* Arizona Univ., Tucson. Steward Observatory.
THE 100 MICRON SURVEYS IN THE NORTHERN AND SOUTHERN HEMISPHERES c43
William F. Hoffmann and Per A. Aannestad *In* NASA. Ames Res. Center Telescope Systems for Balloon-Borne Res. Nov. 1974 p 7-16 refs Sponsored by Smithsonian Astrophysical Obs. (For availability see N75-12735 03-74)
(Grant NGR-03-002-371)
CSCL 20F

Partial surveys in the far infrared in the Northern and Southern Hemispheres have covered 40% of the galactic equator and assorted regions away from the galactic plane. Approximately 120 100-micron objects are known. These are distributed extensively in galactic longitude and concentrated within + or - two degrees in galactic latitude. From this information, some general conclusions can be drawn about the sensitivity and coverage required for a general sky survey in the far infrared. Author

N75-12738* University Coll., London (England).
ASTRONOMICAL OBSERVATIONS WITH THE UNIVERSITY COLLEGE LONDON BALLOON BORNE TELESCOPE c89
R. E. Jennings *In* NASA. Ames Res. Center Telescope Systems for Balloon-Borne Res. Nov. 1974 p 17-25 refs (For availability see N75-12735 03-74)
CSCL 03A

The characteristics of a telescope system which was developed for high altitude balloon astronomy are discussed. A drawing of the optical system of the telescope is provided. A sample of the signals recorded during one of the flights is included. The correlation between the infrared flux and the radio continuum flux is analyzed. A far infrared map of the radio and infrared peaks of selected stars is developed. The spectrum of the planet Saturn is plotted to show intensity as compared with wavenumber. Author

N75-12739* Liege Univ. (Belgium).
THE LIEGE-BALLOON PROGRAM c89
R. Zander *In* NASA. Ames Res. Center Telescope Systems for Balloon-Borne Res. Nov. 1974 p 26-37 refs Sponsored in part by Belgian Govt. (For availability see N75-12735 03-74)
(Grant AF-AFOSR-2317-72)
CSCL 03A

The Liege-balloon program is intended to make high-spectral resolution observations of the sun in the near- and intermediate infrared regions not accessible from the ground. A description of the equipment, followed by a summary of the data obtained till now is presented. Except for ozone whose maximum of concentration lies near 25 Km altitude, the residual mass distribution of the other mentioned molecules decreases with altitude. This is a self-explanatory argument for carrying out spectroscopic observations from platforms transcending the densest layers of the earth's atmosphere. The Liege balloon equipment is primarily intended for very high-resolution solar observations from about 27-30 Km altitude, in all spectral regions between 1.5 and 15.0 microns, not accessible from the ground. Author

N75-12740* Arizona Univ., Tucson.
A BALLOON-BORNE 1 METER TELESCOPE FOR FAR-INFRARED ASTRONOMY c89
G. G. Fazio (Harvard Coll. Obs., Cambridge, Mass.), D. E. Kleinmann

(Harvard Coll. Obs., Cambridge, Mass.), R. W.. Noyes (Harvard Coll. Obs., Cambridge, Mass.), E. L. Wright (Harvard Coll. Obs., Cambridge, Mass.), and F. J. Low *In* NASA. Ames Res. Center Telescope Systems for Balloon-Borne Res. Nov. 1974 p 38-50 (For availability see N75-12735 03-74)
(Grant NGR-22-007-270)
CSCL 03A

The flight of a balloon-borne one-meter telescope for infrared astronomy in the wavelength interval of 40 to 240 microns is discussed. The gyro-stabilized telescope mapped the intensity of the far infrared radiation from NGC 7538, Mars, the Orion Nebula, and W3 with a resolution of one minute and from selected regions of these sources with a resolution of 30 seconds. The infrared detection is described and its capabilities are analyzed. The instrumentation, orientation system, and modes of observation of the telescope are defined. Author

N75-12741* Groningen Rijksuniversiteit (Netherlands). Dept. of Space Research.
MULTICOLOUR FAR INFRARED PHOTOMETRY OF GALACTIC H2 REGIONS **c35**
Henk Olthof *In* NASA. Ames Res. Center Telescope Systems for Balloon-Borne Res. Nov. 1974 p 51-57 refs Sponsored by Royal Acad. of Sci. (For availability see N75-12735 03-74)
CSCL 14E

Results are presented of far infrared photometric measurements of H2 regions in the galactic plane between longitudes 350 and 40 degrees. The results are combined from balloon flights in 1972 and 1973 carried out in cooperation with CNES in the south of France. Author

N75-12742* University Coll., London (England). Dept. of Physics and Astronomy.
DESIGN AND PERFORMANCE OF A 39cm BALLOON-BORNE TELESCOPE **c89**
H. S. Tomlinson, W. A. Towlson, and T. E. Venis *In* NASA. Ames Res. Center Telescope Systems for Balloon-Borne Res. Nov. 1974 p 58-70 refs (For availability see N75-12735 03-74)
CSCL 20F

A system for stabilizing a balloon-borne telescope using a star sensor device is described. Guide stars from minus four to plus four magnitude can be used and the sensor may be offset with respect to the telescope by as much as plus or minus five degrees in elevation and cross elevation to enable parts of the sky containing no suitable guide stars to be viewed. Acquisition of the guide star and setting of the offset coordinates is carried out by ground command and both may be changed in flight. The main design parameters of the equipment are summarized. Block diagrams and circuit diagrams of the star tracker are provided. Author

JN75-12743* Massachusetts Inst. of Tech., Cambridge. Center for Space Research.
AN ORIENTABLE, STABILIZED BALLOON-BORNE GONDOLA FOR AROUND-THE-WORLD FLIGHTS **c02**
George R. Ricker and Walter H. G. Lewin *In* NASA. Ames Res. Center Telescope Systems for Balloon-Borne Res. Nov. 1974 p 71-80 (For availability see N75-12735 03-74)
CSCL 01C

A system capable of pointing a balloon-borne telescope at selected celestial objects to an accuracy of approximately 10 arc minutes for an extended period (weeks to months) without reliance on telemetry is described. A unique combination of a sun/star tracker, an on-board computer, and a gyrocompass is utilized for navigation, source acquisition and tracking, and data compression and recording. The possibilities for intelligent activities by the computer are also discussed. Author

N75-12744* Cornell Univ., New York.
A COOLED TELESCOPE FOR INFRARED BALLOON ASTRONOMY **c89**
Carl Frederick, Michael R. Jacobson, and Martin Harwit *In* NASA. Ames Res. Center Telescope Systems for Balloon-Borne Res. Nov. 1974 p 81-90 (For availability see N75-12735 03-74)
CSCL 20F

The characteristics of a 16 inch liquid helium cooled Cassegrain telescope with vibrating secondary mirror are discussed. The telescope is used in making far infrared astronomical observations. The system houses several different detectors for multicolor photometry. The cooled telescope has a ten to one increase in signal-to-noise ratio over a similar warm version and is installed in a high altitude balloon gondola to obtain data on the H2 region of the galaxy. Author

N75-12745* Rockwell International Corp., Canoga Park, Calif.
A BALLOON-BORNE CRYOGENICALLY COOLED FILTER RADIOMETER **c35**
Arthur G. DeBell *In* NASA. Ames Res. Center Telescope Systems for Balloon-Borne Res. Nov. 1974 p 91-106 Sponsored by ARPA (For availability see N75-12735 03-74)
CSCL 14B

The development of a cryogenically cooled filter radiometer for use with high altitude balloons is discussed. The radiometer has features which include the options for remote operation of two filter wheels each containing six filters at helium temperature and a cryogenic rotary chopper which may be run at 200 cycles per second or positioned open or closed, and a remotely operable chopped blackbody calibration source. The radiometer contains a ten inch diameter liquid nitrogen cooled Cassegrain telescope with nine individually filtered field stops in the focal plane. The telescope is mounted on a two-axis servo operated gimbal which is used to make sky scans under the control of an onboard programmer. Author

N75-12746* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ULTRAVIOLET STELLAR SPECTROPHOTOMETRY FROM A BALLOON PLATFORM **c35**
Yoji Kondo and Curtis Wells *In its* Telescope Systems for Balloon-Borne Res. Nov. 1974 p 107-119 refs (For availability see N75-12735 03-74)
CSCL 14E

A 40 centimeter diameter aperture, balloon-borne telescope and ultraviolet spectrometer is described and selected scientific results are briefly reviewed. The general configuration of the 0.4 angstrom resolution instrument is shown and the utilization of servo-controlled secondary mirror, image dissector detector, and special mirror coatings are discussed. An outlook for astronomical research in the mid-ultraviolet from balloon-borne telescopes is presented together with future development plans for JSC's balloon-borne payload. Author

N75-12747* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
AIROSCOPE: AMES INFRARED BALLOON-BORNE TELESCOPE **c89**
O. L. Koontz and S. G. Scott *In its* Telescope Systems for Balloon-Borne Res. Nov. 1974 p 120-135 refs (For availability see N75-12735 03-74)
CSCL 20F

A balloon-borne telescope system designed for astronomical observations at infrared wavelengths is discussed. The telescope is gyro-stabilized with updated pointing information derived from television, star tracker, or ground commands. The television system furnishes both course and fine acquisition after initial orientation using a pair of fluxgate servo compasses. Command and control is by a UHF link with 256 commands available. Scientific and engineering data are telemetered to the ground station via narrow band F.M. in the L band. The ground station displays all scientific, engineering and status information during the flights and records the command and telemetry digital bit stream for detailed analysis. The AIROscope telescope has a 28-inch diameter primary mirror and Dall-Kirkham optics. The beam is modulated by oscillating a secondary mirror at 11 or 25 Hz with provision for left or right beam fixed positions by command. Author

N75-12748* Ball Bros. Research Corp., Boulder, Colo.
BALLOON PLATFORM FOR EXTENDED-LIFE ASTRONOMY RESEARCH **c02**
L. T. Ostwald *In* NASA. Ames Res. Center Telescope Systems for Balloon-Borne Res. Nov. 1974 p 136-144 (For availability see N75-12735 03-74)
CSCL 01C

A configuration has been developed for a long-life balloon platform to carry pointing telescopes weighing as much as 80

pounds (36 kg) to point at selected celestial targets. A platform of this configuration weighs about 375 pounds (170 kg) gross and can be suspended from a high altitude super pressure balloon for a lifetime of several months. The balloon platform contains a solar array and storage batteries for electrical power, up and down link communications equipment, and navigational and attitude control systems for orienting the scientific instrument. A biaxial controller maintains the telescope attitude in response to look-angle data stored in an on-board computer memory which is updated periodically by ground command. Gimbal angles are computed by using location data derived by an on-board navigational receiver. Author

N75-12749* Arizona Univ., Tucson.
LOW-BACKGROUND AIR-INFRARED TELESCOPE FOR BALLOON-BORNE INFRARED ASTRONOMY c89
Frank J. Low, Wade Poteet, and Robert Kurtz *In* NASA. Ames Res. Center Telescope Systems for Balloon-Borne Res. Nov. 1974 p 145-149 refs Sponsored by NASA (For availability see N75-12735 03-74)
CSCL 20F

The design and performance of a far-infrared telescope are discussed. The instrument is twenty centimeters in diameter and has excellent operating characteristics at 100 microns. The principal features of the telescope are summarized. A diagram of the system is provided. The telescope completed two sucessful balloon flights in which the planets Mars and Saturn were used as calibration sources. Observations were made of the H2 regions W 3, Orion A, NGC 2024, and the bright infrared galaxy M 82. Author

N75-12750* Washington Univ., St. Louis, Mo. Dept. of Physics.
SKY SURVEY AT FAR INFRARED WAVELENGTHS USING A BALLOON-BORNE TELESCOPE c89
M. W. Friedlander, J. Goebel, and R. D. Joseph (Imperial Coll.) *In* NASA. Ames Res. Center Telescope Systems for Balloon-Borne Res. Nov. 1974 p 151-155 (For availability see N75-12735 03-74)
(Grant NGR-26-008-069)
CSCL 03A

Localized sources of far infrared radiation (approximately 50 microns) have been detected during a high altitude balloon flight with a 40 cm telescope and silicon detectors. The flight system is described and preliminary results are presented. A large area of the sky has been scanned for localized sources of far infrared radiation, using a balloon-borne system that was sensitive to wavelengths beyond about 55 microns. Two Molectron silicon bolometers were used, with a Newtonian telescope having a 40 cm primary. The telescope was driven in azimuth at a fixed elevation; this mode of scanning was carried out for the duration of each of two balloon flights. The flight system is described. Author

N75-12751* National Center for Atmospheric Research, Boulder, Colo. National Scientific Balloon Facility.
THE NATIONAL SCIENTIFIC BALLOON FACILITY c09
Robert S. Kubsra *In* NASA. Ames Res. Center Telescope Systems for Balloon-Borne Res. Nov. 1974 p 156-159 (For availability see N75-12735 03-74)
CSCL 14B

The establishment and operation of the National Scientific Balloon Facility are discussed. The balloon launching capabilities are described. The ground support systems, communication facilities, and meteorological services are analyzed. Author

N75-12752* Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
AIR FORCE CAMBRIDGE RESEARCH LABORATORIES BALLOON OPERATIONS c02
Thomas J. Danaher *In* NASA. Ames Res. Center Telescope Systems for Balloon-Borne Res. Nov. 1974 p 160-164 (For availability see N75-12735 03-74)
CSCL 01C

The establishment and functions of the AFCRL balloon operations facility are discussed. The types of research work conducted by the facility are defined. The facilities which support the balloon programs are described. The free balloon and tethered balloon capabilities are analyzed. Author

N75-12753* Geneva Observatory (Switzerland).
THE STELLAR AND SOLAR TRACKING SYSTEM OF THE GENEVA OBSERVATORY GONDOLA c89
Daniel Huguenin *In* NASA. Ames Res. Center Telescope Systems for Balloon-Borne Res. Nov. 1974 p 167-175 refs (For availability see N75-12735 03-74)
CSCL 20F

Sun and star trackers have been added to the latest version of the Geneva Observatory gondola. They perform an image motion compensation with an accuracy of plus or minus 1 minute of arc. The structure is held in the vertical position by gravity; the azimuth is controlled by a torque motor in the suspension bearing using solar or geomagnetic references. The image motion compensation is performed by a flat mirror, located in front of the telescope, controlled by pitch and yaw servo-loops. Offset pointing is possible within the solar disc and in a 3 degree by 3 degree stellar field. A T.V. camera facilitates the star identification and acquisition. Author

N75-12754* Washington Univ., St. Louis, Mo. Dept. of Physics.
A HIGH SENSITIVITY BALLOON-BORNE X-RAY TELESCOPE SYSTEM c89
M. R. Pelling *In* NASA. Ames Res. Center Telescope Systems for Balloon-Borne Res. Nov. 1974 p 176-189 refs (For availability see N75-12735 03-74)
CSCL 14E

A high sensitivity X-ray telescope system suitable for photometric type observations from balloon altitudes is described. The balloon gondola system is defined to include the performance requirements and the overall performance requirements of the balloon gondola support system. Diagrams of the gondola and the installed components are provided. The pointing and control system of the telescope is analyzed. Author

N75-12755* Lockheed Electronics Co., Inc., Azusa, Calif.
BALLOON-BORNE ULTRAVIOLET STELLAR SPECTROMETER: ACQUISITION, TRACKING AND COMMAND SYSTEMS c35
W. C. Gibson *In* NASA. Ames Res. Center Telescope Systems for Balloon-Borne Res. Nov. 1974 p 190-201 refs (For availability see N75-12735 03-74)
CSCL 14B

The NASA Balloon-borne Ultraviolet Stellar Spectrometer (BUSS) which is carried to an altitude of 40 km by a 15 million cubic foot balloon for night-time observations of ultraviolet stellar spectra is discussed. The BUSS optical system, comprising an 0.40 m aperture Cassegrain telescope and an Ebert-Fastie spectrometer, points at various selected stars and focuses a portion of their spectra on the photocathode of an image dissector tube. The spectral region between 2,775 Angstroms and 2,825 Angstroms is sampled by the detector at 0.25 Angstroms increments using photon counting techniques. The pointing system for the payload uses a pair of orthogonal magnetometers which sense the earth's magnetic field for an aximuth reference, and a platform potentiometer for an elevation reference. This pointing system places the target star within the 3x1 degree field of view of an outer optical star tracker. The outer star tracker is then used to point the entire instrument to within one arc minute of the target star. Author

N75-12756* Harvard Coll. Observatory, Cambridge, Mass. Center for Astrophysics.
STABILIZATION, POINTING AND COMMAND CONTROL OF A BALLOON-BORNE 1-METER TELESCOPE c37
N. L. Hazen, L. M. Coyle, and S. M. Diamond *In* NASA. Ames Res. Center Telescope Systems for Balloon-Borne Res. Nov. 1974 p 202-224 refs Prepared in cooperation with Smithsonian Astrophysical Obs., Cambridge, Mass. and Arizona Univ., Tucson. (For availability see N75-12735 03-74)
(Grant NGR-22-007-270)
CSCL 14B

A 1-meter balloon-borne telescope has been constructed and flown to observe far-infrared radiation from celestial sources. The attitude control systems must perform to the

diffraction limit of the telescope for stabilization and have positioning capability for source acquisition. These and associated systems are discussed in detail, as is the command control of the payload as a whole. Author

N75-12757* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
AIROSCOPE STELLAR ACQUISITION **c89**
Gordon J. Deboo, Gilbert T. Parra, and Roger C. Hedlund *In its* Telescope Systems for Balloon-Borne Res. Nov. 1974 p 225-238 (For availability see N75-12735 03-74)
CSCL 20F

The acquisition system which operates in conjunction with a balloon-borne TV system, boresighted to a telescope is described. It has two main functions, a star field monitor and an offset star tracker. The design of the system was strongly influenced by the TV camera, which uses the same interlaced scanning system as is employed in commercial television broadcasting. To reduce power and bandwidth requirements, the star field information transmitted in our system consists only of the horizontal and vertical coordinates of each star and its brightness. As a star field monitor the system provides video thresholding, camera blemish suppression, coordinate digitization in 3 axes, circuity to recognize as single star the dispersed video signals resulting from one star overlapping adjacent scanning lines and storage of all signals for readout by the telemetry at appropriate times. Author

N75-12758* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
THE AIROSCOPE POINTING AND STABILIZATION SYSTEM **c37**
James P. Murphy and Kenneth R. Lorell *In its* Telescope Systems for Balloon-Borne Res. Nov. 1974 p 239-267 refs (For availability see N75-12735 03-74)
CSCL 20F

The AIROscope pointing and stabilization system is described. The system is configured with three gimbal axes and rate integrating gyro stabilization to provide a stable platform for infrared astronomy. Error signals for on and off-axis pointing are derived from a video sensor which also drives a ground station display. Other features of the system include direct drive torque motors and electronic suspension damping. Results of analysis and simulations used to design the control loops, and a pointing error analysis are presented. Author

N75-12759* Ball Bros. Research Corp., Boulder, Colo.
BALLOON INFRARED ASTRONOMY PLATFORM (BIRAP) **c89**
M. E. Greeb and G. A. True *In* NASA. Ames Res. Center Telescope Systems for Balloon-Borne Res. Nov. 1974 p 268-283 refs Sponsored in part by Groningen Univ., The Netherlands (For availability see N75-12735 03-74)
CSCL 03A

The development of a balloon-borne attitude control system for infrared astronomy studies is discussed. The Balloon Infrared Astronomy Platform (BIRAP) is the result of the development effort. The BIRAP uses electronic gimballing for the offset pointing which eliminates a set of mechanical gimbals. Guide stars with visual magnitudes as low as plus 6 are used for fine tracking assuring that all areas of the sky can be covered. The BIRAP control concept uses a closed loop system in the airborne equipment with automatic update through a command link that can be operated either manually or automatically by a ground based computer. Author

N75-12760* Marconi Space and Defence Systems Ltd., Camberley (England). Stabilized Balloon Platform Project.
A GENERAL PURPOSE STABILISED BALLOON PLATFORM **c02**
John How *In* NASA. Ames Res. Center Telescope Systems for Balloon-Borne Res. Nov. 1974 p 284-293 (For availability see N75-12735 03-74)
CSCL 01C

The development of a three axis stabilized balloon platform capable of being operated in three modes of increasing accuracy is discussed. The system relies on angular motion sensing for primary feedback with linear accelerometers, magnetometers, and a star sensor for positional information. When under primary control the system will acquire and stabilize on any accessible part of the celestial sphere. A video verification system is included to provide pointing confirmation. Under improved accuracy control, the star sensor is used to lock onto a target star. Author

N75-12761* National Center for Atmospheric Research, Boulder, Colo. National Scientific Balloon Facility.
NCAR TELEMETRY AND COMMAND SYSTEM **c32**
W. Jack Snider *In* NASA. Ames Res. Center Telescope Systems for Balloon-Borne Res. Nov. 1974 p 294-298 (For availability see N75-12735 03-74)
CSCL 09F

The development of a pulse code modulation data encoder, a computerized ground station, and a PCM command system for obtaining and reproducing data from a balloon-borne experiment is discussed. The components of the system and the manner of operation are described. The capabilities and limitations of the system are analyzed. Author

N75-12762* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
AIROSCOPE TELEMETRY SYSTEM **c32**
Kenneth J. Pitts *In its* Telescope Systems for Balloon-Borne Res. Nov. 1974 p 299-308 refs (For availability see N75-12735 03-74)
CSCL 09F

The AIROscope (Ames Infrared Observatory telescope) telemetry system is described from signal conditioning on the gondola to display and storage at the ground station. All analog and digital data from the systems and experiments on the gondola go to a PCM encoder which formats the data into 10-bit words. Therefore, 0.1-percent resolution is inherently available for experimental data. The coded bit stream directly modulates the carrier of the FM transmitter. To insure reliable transmission over a 650-km range an 11-watt FM transmitter operating at 1483.5 MHz is used on the gondola. Modulation is narrow band FM with a maximum deviation of plus or minus 500 kHz. The maximum modulation frequency is determined by the data bit rate which could be as high as 500 kbps. Presently, a rate of 20.48 kbps is used. The ground station receiving system includes a steerable antenna (19-db gain), preamplifier (21-db gain) and receiver. All data are recorded on a tape recorder. The recorded signal then can be played back through the PCM decommutator unit at a later time for detailed data analysis by the experimenter. Author

N75-12763* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
AIROSCOPE COMMAND SYSTEM **c32**
W. Barrows *In its* Telescope Systems for Balloon-Borne Res. Nov. 1974 p 309-318 (For availability see N75-12735 03-74)
CSCL 09F

A PCM telemetry command system is presented having a capacity of 256 unique commands, an end-to-end actuation time of less than 250 milliseconds, and an address plus complementary command code to provide security against the acceptance of anything but intended commands. The system consists of a ground-based encoder and a balloon-borne decoder, both built using low-current drain, high reliability CMOS logic elements. Commands are normally issued by a simple switch closure to +5VDC on the appropriate input line, however as a backup mode, the 8-bit command may be entered manually on 8 toggle switches and executed via a SEND button. In any case, the command is then serialized into a PCM bit stream and sent via a P-Band radio link to the DECODER aloft. All 256 outputs from the DECODER are buffered through drivers and thus may be used to drive CMOS, TTL, or DTL logic. Author

N75-12764# Defence Standards Labs., Maribyrnong (Australia).
A METHOD FOR MEASURING SMALL TRANSMITTANCES AND REFLECTANCES WITH THE CARY 14R SPECTROPHOTOMETER-SPECTRORADIOMETER
R. A. Stokes Jun. 1974 12 p refs
(DSL-TN-334) Avail: NTIS HC $3.25

A method is described for making small transmittance and reflectance measurements with the Cary 14R spectrophotometer by means of accessories normally used with its radiometric

equipment. The method is applicable to all low level spectrophotometric measurements but has particular application in direct, nondestructive measurements of welding filters. Author

N75-12765# California Univ., Berkeley. Lawrence Berkeley Lab.
HIGH RESOLUTION IMAGING IN BRIGHT AND DARK FIELD AT HIGH VOLTAGES
L. J. Chen and K. Seshan Mar. 1974 3 p refs Presented at 32d Ann. Meeting of the Electron Microscopy Soc. and Exhibition, St. Louis, 13 Aug. 1974
(Contract W-7405-eng-48)
(LBL-2712; Conf-740803-3) Avail: NTIS HC $3.25

From thirty-second annual meeting of the electron microscopy society and exhibition; St. Louis, Missouri, U.S.A. (13 Aug. 1974). NSA

N75-12766# California Univ., Berkeley. Lawrence Berkeley Lab.
NON-CONVENTIONAL ELECTRON MICROSCOPY IN SMALL DEFECT CHARACTERIZATION
K. Seshan Feb. 1974 2 p refs Presented at 32d Annual Meeting of the Electron Microscopy Soc. and Exhibition, St. Louis, 13 Aug. 1974
(Contract W-7405-eng-48)
(LBL-2585; Conf-740803-2) Avail: NTIS HC $3.25

Two nonconventional imaging techniques which yield narrow images (20-40 A) are applied to small defects: symmetric weakbeam bright field and weakbeam condition with two S sub g values. NSA

N75-12767# California Univ., Berkeley. Lawrence Berkeley Lab.
SELF-FOCUSING AND OPTICAL-FIELD-INDUCED EFFECTS IN LIQUIDS AND LIQUID CRYSTALS Ph.D. Thesis
K. L. Wong May 1974 63 p refs
(Contract W-7405-eng-48)
(LBL-2592) Avail: NTIS HC $4.25

An appreciable molecular ordering was induced by a relatively weak laser beam in the isotropic phase of nematic liquid crystals. The temperature dependence of the optical Kerr effect and the intensity dependent ellipse rotation effect are studied. The nonlinear refractive index due to molecular reorientational relaxation times is measured as a function of temperature and demonstrates the critical slowing down behavior. A nematic compound in its isotropic phase is used to study transient self-focusing. Experimental results show qualitative, and quantitative agreement with the existing theoretical calculations on transient self-focusing. The spectral broadening of light emitted from a filament of light under controlled input condition was measured with single nanosecond mode-locked laser pulses. Results are in semi-quantitative agreement with predictions from the moving-focus model. Author (NSA)

N75-12768# Stanford Research Inst., Menlo Park, Calif.
INVESTIGATION OF A PHOTODICHROIC MATERIAL FOR HOLOGRAPHIC STORAGE AND RECOVERY Annual Technical Report, Sep. 1973 - Aug. 1974
Matt Lehmann and R. A. Armistead Aug. 1974 30 p refs
(Contract N00014-72-C-0260; SRI Proj. 1777)
(AD-785274) Avail: NTIS CSCL 20/6

The effect of impurities on the formation of color centers in the photodichroic crystals of sodium fluoride and on the fatigue of the write/read cycles has been examined. The results of this effort suggest that lithium ion implantation is the only satisfactory method for producing controllable color center depth with optimum fluence. There is now a need to determine the optimum ion for implantation in potassium chloride and other alkali halides that are candidates for information storage. Controlled depth of color centers is essential to maintain satisfactory resolution with high orders of minification. A unique procedure was developed giving major improvements in effective writing sensitivity. This procedure, which uses a readout system with crossed polarizers, gives high contrast, high resolution images and also permits the photodichroic alkali halide to be used as the storage medium in an incoherent/coherent processor. (Modified author abstract) GRA

N75-12769# Naval Air Development Center, Warminster, Pa.
SPECIFICATION FOR VISUAL TARGET ACQUISITION SYSTEM AN/AVG-8A (XJ-1) FLIGHT TEST PROGRAM INTERFACE CONTROL DOCUMENT SH 4506-02-73
5 Oct. 1973 83 p refs
(AD-779909) Avail: NTIS CSCL 19/5

The document establishes and controls the specific technical criteria for the installation of the AVG-8A Visual Target Acquisition System (VTAS) into the F-14A weapon system on aircraft Buno. TBD. The items covered are limited to those where control of the interface is necessary for the aircraft contractor, the F-14A weapon control system contractor and the AVG-8A contractor to perform their respective tasks. GRA

N75-12770# Technology Service Corp., Silver Spring, Md.
STUDIES OF MONOCHROMATIC, QUASI-MONOCHROMATIC AND BROADBAND IMAGING TECHNIQUES: A GENERALIZED IMAGING INTEGRAL Project Technical Report, Jun. 1973 - Jun. 1974
F. L. Rees 1 Aug. 1974 80 p refs
(Contract N00014-73-C-0267)
(AD-785269; TSC-W6-31) Avail: NTIS CSCL 17/1

This report contains a development of a general imaging integral including relative motion between the source and the receiving point. This integral provides a unifying basis from which all the previous results on monochromatic, quasi-monochromatic and broadband imaging can be derived. In fact, this report develops a generalized integral relating either cross-spectral density or cross-variance between a pair of field points remote from the radiating body to an equivalent measure between pairs of points on the body when relative motion is involved. These relationships will be shown to involve a conjugated pair of Green's transfer-functions or impulse-functions, respectively; depending upon whether spectral density or covariance is used as a measure. (Modified author abstract) GRA

N75-12771# RAND Corp., Santa Monica, Calif.
A CORRECTION FOR MIDDLETON'S VISIBLE AND INFRARED RADIATION EXTINCTION COEFFICIENTS DUE TO RAIN Interim Report
C. C. Chen Aug. 1974 17 p refs
(Contract F44620-73-C-0011; Proj. RAND)
(AD-785121; R-1523-PR) Avail: NTIS CSCL 20/6

This report describes how Middleton's simple expression for the visible- and infrared-radiation extinction coefficient due to rain is incorrect. By improperly using Stokes: law to obtain the terminal velocity of a raindrop through air, Middleton underestimated the extinction coefficient due to rain by nearly a factor of ten. A revised expression for this coefficient is derived here using empirically determined values for raindrop terminal velocity. The calculated values of the extinction coefficient thus obtained provided much closer agreement with the measured values.
Author (GRA)

N75-12772# Naval Electronics Lab. Center, San Diego, Calif.
POWER REQUIREMENTS FOR MAGNETO-OPTIC MODULATION DEVICES, A THEORETICAL STUDY Final Report, Sep. 1973 - Jul. 1974
R. A. Pappert and H. F. Taylor 13 Jun. 1974 35 p
(RR014110; NR Proj. 215-203)
(AD-784977; NELC-TR-1924) Avail: NTIS CSCL 20/6

Switching and modulation of laser light at 1.152 micrometer in magnetooptic waveguides of garnet films has been reported by Tien et al. In particular, they report modulation up to frequencies of 80 MHz and about 50% conversion of light between TE and TM waveguide modes over distances of about 8 mm achieved with a serpentine circuit carrying 0.5 ampere. No comprehensive theoretical analysis of such a device has yet appeared, and questions concerning the ultimate bandwidth, degree of miniaturization, electrical power requirements, and channel compatibility have remained unanswered. This report represents an initial attempt to answer some of these questions. Specifically, power requirements for reasonable film parameters and electrode configurations are considered. Crucial for the analysis described is the proposal of a model which can represent adequately the performance of magnetooptic waveguides and simultaneously be simple enough to be analytically tractable. The model used in the present study is delineated, a summary

of the significant equations is presented, and the results and conclusions are summarized. GRA

N75-12773# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
DISCRETE-TIME DOMAIN ANALYSIS OF A TWO-AXIS BEAM DEFLECTOR M.S. Thesis
John P. Kopaz Jun. 1974 148 p refs
(AD-785133; GE/EE/74-10) Avail: NTIS CSCL 17/8

The state-variable feedback model of a two-gimbal planar-mirror optical tracking system is simulated in both the continuous-time and discrete-time domains using a digital-machine simulation language called MIMIC. Four open-loop models are analyzed with respect to a conventional set of performance indices. The required model parameters are provided by an auxiliary program called POLSLVR which is specifically tailored for this problem. Emphasis is placed on obtaining acceptable solutions requiring the least amount of system gain with a relatively rigid sampling time specification to reduce the effects of a base-motion disturbance. Author (GRA)

N75-12703 Toronto Univ. (Ontario). Dept. of Physics.
OPTICAL PROBING OF SURFACE WAVES
G. I. A. Stegeman *In* Commun. Res. Centre Proc. of the Can. Workshop on Acoustic Surface Waves Jun. 1974 5 p (For availability see N75-12696 03-70)

N75-12837 Joint Publications Research Service, Arlington, Va.
ACHIEVEMENTS AND DEVELOPMENT PROSPECTS OF OPTOELECTRONICS
Bohdan Mroziewicz *In its* Transl. on Eastern Europe: Sci. Affairs, no. 438 (JPRS-63447) 15 Nov. 1974 p 6-25 refs Transl. into ENGLISH from Elektron. (Warsaw), no. 7-8, Jul.-Aug. 1974 p 299-307 (For availability see N75-12836 03-81)

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.

For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N75-12774 Max-Planck-Institut fuer Physik und Astrophysik, Munich (West Germany). Inst. fuer Extraterrestrische Physik.
A SHEAR FLOW INSTABILITY DUE TO THE FINITE ION GYRORADIUS
Gerhard Haerendel Mar. 1974 46 p refs Submitted for publication
(MPI-PAE/Extraterr-96) Avail: Issuing Activity

The joint action of density gradient and shear flow in magnetospheric plasma was investigated. In a collision-free plasma, shear flows which are transverse to a magnetic field in the presence of a density gradient can be unstable, if the divergence of the transverse electric field corresponds to a negative space charge. Drift shear instability derived for small frequencies is of the flute type, and it influences the finite ion Lamor radius. Drift waves' phase velocity is closely related to the ion Lamor drift, and the growth rate is proportional to the density gradient and the square root of the velocity shear. Stabilization occurs at wave lengths comparable to or shorter than the ion Lamor radius. Drift shear instability plays significant role (1) in the production of ionospheric irregularities with wavelengths of less than 100 m, (2) in the formation of striations in barium clouds at greater heights, and (3) in the origin of auroral rays. Author (ESRO)

N75-12775*# Princeton Univ., N.J. Guggenheim Aerospace Propulsion Labs.
PULSED ELECTROMAGNETIC GAS ACCELERATION
Semiannual Report, 1 Jan. - 30 Jun. 1974
Robert G. Jahn, Woldemar VonJaskowsky, and Kenn E. Clark Jul. 1974 127 p refs
(Grant NGL-31-001-005)
(NASA-CR-140996; SAR-634w) Avail: NTIS HC $5.75 CSCL 20I

Detailed measurements of the axial velocity profile and electromagnetic structure of a high power, quasi-steady MPD discharge are used to formulate a gasdynamic model of the acceleration process. Conceptually dividing the accelerated plasma into an inner flow and an outer flow, it is found that more than two-thirds of the total power in the plasma is deposited in the inner flow, accelerating it to an exhaust velocity of 12.5 km/sec. The outer flow, which is accelerated to a velocity of only 6.2 km/sec, appears to provide a current conduction path between the inner flow and the anode. Related cathode studies have shown that the critical current for the onset of terminal voltage fluctuations, which was recently shown to be a function of the cathode area, appears to reach an asymptote for cathodes of very large surface area. Detailed floating potential measurements show that the fluctuations are confined to the vicinity of the cathode and hence reflect a cathode emission process rather than a fundamental limit on MPD performance. Author

N75-12776# Lockheed Missiles and Space Co., Palo Alto, Calif.
ON THE INTERACTION OF HYDROMAGNETIC WAVES WITH EARTH'S MAGNETOSPHERE IN A QUASI-HYDRODYNAMICS APPROXIMATION
S. V. Sobolev 1974 6 p refs Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow), v. 14, no. 5, 1974 p 841-845
Avail: NTIS HC $3.25; National Translation Center, John Crerar Library, Chicago, Ill. 60616

The transport of magnetoacoustic wave energy through the magnetosphere boundary, considered as a plane tangential discontinuity, was studied in the Chu-Goldberger-Low quasi-hydrodynamic approximation. Expressions governing the energy density and the energy flux density of small oscillations were obtained in this approximation. Author

N75-12777# Lockheed Missiles and Space Co., Palo Alto, Calif.
HYDROMAGNETIC WAVE PROPAGATION IN A THREE-DIMENSIONAL MAGNETOSPHERE, 2
L. L. Vanian and A. S. Lipatov 30 Jul. 1973 4 p refs Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow), v. 14, no. 5, 1974 p 837-840
Avail: NTIS HC $3.25; National Translation Center, John Crerar Library, Chicago, Ill. 60616

The three-dimensional perturbation of the magnetospheric plasma under the impingement of a weak plane solar-wind pressure inhomogeneity on the magnetopause was examined in the MHD approximation. The configuration of the initial magnetosphere and the geomagnetic field was selected on the basis of the Mead and Beard analyses. Author

N75-12778# Tokyo Univ. (Japan). Inst. of Space and Aeronautical Science.
PROPAGATION OF ELECTRON WAVES IN A NON-MAXWELLIAN PLASMA
Yoshinobu Kawai (Kyushu Univ.), Yoshiharu Nakamura, Tomizo Itoh, Tomio Hara (Nagoya Univ.), and Takaya Kawabe (Nagoya Univ.) Nov. 1974 7 p refs
(ISAS-517-Vol-39-14) Avail: NTIS HC $3.25

The dispersion relation of electron waves in a non-Maxwellian plasma have been investigated experimentally. It is observed that the dispersion relation of the Landau mode is modified and that a new wave mode is observed for frequencies less than the electron Langmuir frequency. These experimental results are compared with a simple theoretical model. Author

N75-12779# Deutsche Gesellschaft fuer Luft- und Raumfahrt, Cologne (West Germany).
MAGNETOFLUIDDYNAMICS [MAGNETOFLUIDDYNAMIK]
May 1974 153 p refs In GERMAN; ENGLISH summary Proc. of the DGLR meeting, Stuttgart, 20-21 Feb. 1974
(DLR-Mitt-74-20) HC $6.25

Topics on magnetofluid dynamics include the following: MHD power conversion, production and acceleration of plasmas, interaction of electric arcs and plasma flows with magnetic fields, and plasma and gasdynamic laser systems. For individual titles, see N75-12780 through N75-12791.

N75-12780 Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Stuttgart (West Germany). Inst. fuer Energiewandlung und Elektrische Antriebe.
IS MHD DEAD? [IST MHD TOT?]
Walter Peschka *In* DGLR Magnetofluiddyn. May 1974 p 7-22

In GERMAN (For availability see N75-12779 03-75)

The history of magnetohydrodynamics (MHD) research for energy conversion is presented. Combustion MHD, noble gas MHD, and liquid metal MHD are discussed in detail. ESRO

N75-12781 Kiel Univ. (West Germany). Inst. fuer Experimentalphysik.

PROBLEMS IN THE GENERATION OF EXTREMELY DENSE PLASMAS BY MEANS OF ELECTRIC WIRE EXPLOSIONS [PROBLEME DER ERZEUGUNG EXTREM DICHTER PLASMEN MITTELS ELEKTRISCHER DRAHTEXPLOSIONEN]

Helmut Jaeger *In* DGLR Magnetofluiddyn. May 1974 p 23-38 refs In GERMAN (For availability see N75-12779 03-75)

Processes occurring during pulsed heating in cyclindrical metallic conductors leading to a very inhomogeneous discharge column, and inhibiting the attainment of extreme thermodynamic conditions within a large spatial area are discussed. Ways to eliminate these processes and results obtained are discussed. ESRO

N75-12782 Technische Universitaet, Munich (West Germany). Inst. fuer Raumfahrttechnik.

THEORETICAL INVESTIGATIONS ON THE COAXIAL ACCELERATOR WITH COMPRESSION COIL [THEORETISCHE UNTERSUCHUNGEN UEBER DEN KOAXIALEN BESCHLEUNIGER MIT KOMPRESSIONSSPULE]

Heribert Kuczera *In* DGLR Magnetofluiddyn. May 1974 p 39-52 refs In GERMAN (For availability see N75-12779 03-75)

The construction and functioning of a coaxial plasma accelerator with compression coil for the simulation of micrometeorides using glass particles are discussed. Methods for calculating the current distribution and the magnetic field of the compressor coil are presented. ESRO

N75-12783 Technische Hochschule, Hanover (West Germany). Lehrstuhl A fuer Mechanik.

THE INFLUENCE OF HEAT TREATMENT ON A MAGNETOGASDYNAMIC FLOW [DER EINFLUSS DER WAERMEZUFUHR IN EINER MAGNETOGASDYNAMISCHEN STROEMUNG]

Ingolf Teipel *In* DLGR Magnetofluiddyn. May 1974 p 53-64 refs In GERMAN (For availability see N75-12779 03-75)

Model studies on a detonation wave to which heat is applied were made, and the shock equations are discussed in detail. ESRO

N75-12784 Technische Universitaet, Munich (West Germany). Inst. fuer Elektrophysik.

ROTATING PLASMA DISK IN STATIONARY OPERATION [ROTIERENDE PLASMASCHEIBE IM STATIONAEREN BETRIEB]

Stefan F. Marlier *In* DGLR Magnetofluiddyn. May 1974 p 65-73 refs In GERMAN (For availability see N75-12779 03-75)

Measurements on a rotating plasma disk are described for the case where a radial electric current produces, with the aid of an external magnetic field, a force which accelerates the plasma in azimuthal direction. Viscous forces limit the attainable azimuthal velocities. The rotating plasma produces centrifugal forces giving rise to a radial pressure gradient. ESRO

N75-12785 Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Stuttgart (West Germany). Inst. fuer Plasmadynamik.

PRINCIPLES OF AN AXISYMMETRIC MPD-ACCELERATOR WITH EXTERNAL MAGNETIC FIELD [PRINZIPIEN DES AXIALSYMMETRISCHEN MPD-BESCHLEUNIGERS MIT UEBERLAGERTEM MAGNETFELD]

Gerhard Kruelle *In* DGLR Magnetofluiddyn. May 1974 p 75-87 refs In GERMAN (For availability see N75-12779 03-75)

The functioning of an axisymmetric MPD-accelerator with an external magnetic field is discussed in terms of the mathematical descriptions for current, force, and energy densities. The meridional current distribution and the current-flow coupling are dealt with, along with the optimization of laboratory apparatus X16. ESRO

N75-12786 Technische Universitaet, Munich (West Germany). Inst. fuer Elektrophysik.

INVESTIGATION ON THE PLASMA JET - DIPOLAR MAGNETIC FIELD INTERACTION [UNTERSUCHUNG DER WECHSELWIRKUNG PLASMASTRAHL - DIPOLMAGNETFELD]

Klaus Landes *In* DGLR Magnetofluiddyn. May 1974 p 89-97 In GERMAN (For availability see N75-12779 03-75)

The interaction between a plasma jet and a dipolar magnetic field was determined using Hall and Langmuir probes. Results of the measurments are discussed. ESRO

N75-12787 Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Stuttgart (West Germany). Inst. fuer Plasmadynamik.

THE PITOT PRESSURE IN MAGNETOGASDYNAMIC FLOWS [DER PITOTDRUCK IN MAGNETOGASDYNAMISCHEN STROEMUNGEN]

Siegfried Krause *In* DGLR Magnetofluiddyn. May 1974 p 99-109 In GERMAN (For availability see N75-12779 03-75)

A mathematical theory for the pitot pressure in a magnetohydrodynamic flow was developed and tested experimentally in order to determine the influence of electromagnetic effects on a plasma flow. ESRO

N75-12788 Technische Universitaet, Munich (West Germany). Inst. fuer Elektrophysik.

THE RADIAL FREE FLIGHT ARC [DER RADIAL FREIE VOLLKREISBOGEN]

Hans-Georg Staeblein and Wolfgang Tiller *In* DGLR Magnetofluiddyn. May 1974 p 111-119 refs In GERMAN (For availability see N75-12779 03-75)

A mathematical theory for a radial free light arc in equilibrium was developed to explain temperature distribution and mass flow in the light arc. Stabilization mechanisms are detailed and a model calculation is presented. ESRO

N75-12789 Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Stuttgart (West Germany). Inst. fuer Plasmadynamik.

FAST EXPANDING CARBON PLASMA JETS AS LASER-ACTIVE MEDIUM? [SCHNELL EXPANDIERENDE KOHLENSTOFFPLASMASTRAHLEN ALS LASERAKTIVES MEDIUM?]

Wolfram Schock and Wolfgang Schall *In* DGLR Magnetofluiddyn. May 1974 p 121-124 refs In GERMAN (For availability see N75-12779 03-75)

The use of expanding carbon plasmas as laser active media for short wave radiation (247.86 mm) is discussed, and a plasmadynamic carbon laser was developed. ESRO

N75-12790 Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Stuttgart (West Germany).

ASPECTS OF PLASMADYNAMIC LASERS: HIGH OUTPUTS AT SHORT WAVELENGTHS [ASPEKTE DES PLASMADYNAMISCHEN LASERS: HOHE LEISTUNGEN BEI KURZEN WELLENLAENGEN]

Mark-Udo Beth, Willy L. Bohn, Peter Hoffmann, and Manfred Kling *In* DGLR Magnetofluiddyn. May 1974 p 125-136 refs In GERMAN (For availability see N75-12779 03-75)

The theoretical foundations of plasmadynamic lasers, based on nonequilibrium effects in plasma flows, are discussed along with preliminary experiments which indicate that inversion in the excited energy levels of the atoms or ions in continuous fast flowing plasmas can be accomplished. The expected properties of plasmadynamic lasers are discussed, with emphasis on probable wavelengths and attainable outputs. ESRO

N75-12791 Institut Franco-Allemand de Recherches, St. Louis (France).

ON PRODUCING A CO2-LASER MEDIUM FOR HIGH OUTPUT WITH AN ELECTRIC DISCHARGE IN A SUPERSONIC FLOW [ERZEUGUNG EINES CO2-LASER-MEDIUMS FUER HOHE LEISTUNG DURCH EINE ELEKTRISCHE ENTLADUNG IN EINER UEBERSCHALLSTROEMUNG]

Bernard Gautier, Rene Joeckle, Hans Nett, and Gerard Stern *In* DGLR Magnetofluiddyn. May 1974 p 137-151 In GERMAN (For availability see N75-12779 03-75)

The output of a carbon dioxide laser was increased by applying electric charges in a supersonic laser gas flow. The

fundamentals of a carbon dioxide laser with electric excitation are presented, and experimental design, the measuring equipment, and the measuring results are discussed. ESRO

N75-12792# Academy of Sciences (USSR), Moscow.
INTERACTIONS OF FAST PARTICLES WITH WAVES OF COSMIC MAGNETOACTIVE PLASMA
V. N. Tsytovich 1973 50 p refs In RUSSIAN
(NP-20009) Avail: AEC Depository Libraries HC $5.50

The general concepts in the interaction of fast particles with waves of magnetoactive plasma are derived. The mechanisms of this reaction are defined. The interaction of fast particles with plasma oscillations is described. Wave instabilities caused by fast particles are considered. The isotropization of cosmic radiation is discussed. The energy spectrum of relativistic particles is determined. NSA

N75-12793# Commissariat a l'Energie Atomique, Fontenay-aux-Roses (France). Groupe de Recherches sur la Fusion Controlee.
POSSIBILITY OF HEATING TFR PLASMAS BY THE ABSORPTION OF FAST MAGNETOHYDRODYNAMIC WAVES
J. Adam Oct. 1973 59 p refs In FRENCH
(EUR-CEA-FC-711) Avail: AEC Depository Libraries HC $6.00

The possibility of heating a TFR plasma using fast magnetohydrodynamic modes (magnetoacoustic waves) is examined. The characteristics of the dispersion relation and the charge impedance of an antenna capable of emitting these modes are considered together with the heating effects produced by these waves in the regions of the ion cyclotron resonance frequency and its second harmonic. Temperature rise calculations were effected for the plasma on the basis of various hypothesis. It is shown that the wave can be excited in the useful thermonuclear density region (n > 10,000,000,000,000) with a power of the order of MW's using a reduced surface antenna system, an oscillating potential of 17kV being applied across it for an output of 1MW. The linear wave dissipation mechanisms considered at frequencies of omega (ci) and 2 omega (ci) lead to a rapid heating of the ionic components. NSA

N75-12794# Los Alamos Scientific Lab., N.Mex.
PLASMA CHEMISTRY AND THE DYNAMICS OF CARBON FOILS IRRADIATED BY HIGH INTENSITY LASER PULSES
S. D. Rockwood Feb. 1974 10 p refs
(Contract W-7405-eng-36)
(LA-5532-MS) Avail: NTIS HC $3.25

Calculations are presented which display the temporal behavior of electron and ion temperatures and ion number densities during the evolution of a carbon plasma irradiated by an intense laser pulse. These plasma kinetics calculations are coupled with a one dimensional Lagrangian hydrocode simulation of the disassembly of thin carbon foil targets. Results of these calculations show line radiation from the targets to be negligible for incident fluxes phi greater than 10 to the 14th power watts while bound free radiation represents the dominant radiation loss in many cases of interest. From the results of the numerical calculations an analytic model is developed which predicts the experimentally observed dependence of transmission through thin targets as a function of laser and target parameters. Author (NSA)

N75-12795# Sandia Labs., Albuquerque, N.Mex.
ENERGY DISTRIBUTIONS OF IONS FROM A PULSED VACUUM ARC
J. T. Grissom 1974 6 p refs Presented at the 6th Intern. Symp. on Discharges and Elec. Insulation in Vacuum, Swansea, England Sponsored by AEC
(SLA-74-5034; Conf-740716-2) Avail: NTIS HC $3.25

Single shot measurements of the complete energy distributions of mass selected ions from a 6-micro sec vacuum arc discharge were performed using a time-of-flight mass spectrometer. The energy distributions of ions mass separated according to flight times in a two meter drift tube were obtained by observing the spreading in time of individual 15-nsec ion bursts produced by the spectrometer deflection plate assembly. Energy distributions of ions identified as Al(+1), Al(+2), Al(+3), O(+1), O(+2), Cr(2), Cr(+3) and Ni(+3) or Co(+3) were measured. Author (NSA)

N75-12796# Danish Atomic Energy Commission, Risoe. Research Establishment.
INVESTIGATIONS OF PLASMA DIELECTRIC FUNCTIONS
H. L. Pecseli Mar. 1974 26 p refs
(RISO-301) Avail: AEC Depository Libraries HC $4.50

General relations concerning dielectric functions are obtained using an analysis from electric network theory. A general discussion of wave stability and wave energy is presented based on these relations. Author (NSA)

N75-12797# Atomic Energy Commission, Washington, D.C. Div. of Controlled Thermonuclear Research.
FUSION POWER BY MAGNETIC CONFINEMENT
Feb. 1974 104 p refs
(WASH-1290) Avail: NTIS HC $5.25

The overall fusion program to develop a working fusion reactor using low-density closed systems, high-density systems, and open systems is outlined. The present and near-term emphasis among these programs is and will be about 60% tokamaks, 20% high density, and 20% mirrors. The areas of reaearch to be considered for furture work are outlined. Items concerning funding and the overall program are discussed. NSA

N75-12798# Stevens Inst. of Tech., Hoboken, N.J.
INVESTIGATIONS IN PLASMA DYNAMICS Annual Progress Report, 15 Sep. 1973 - 15 Sep. 1974
G. Schmidt 1974 9 p refs
(Contract AT(11-1)-3004)
(COO-3004-6) Avail: NTIS HC $3.25

The properties of the beam-plasma instability in a nonuniform medium were investigated. It was found that a threshold current exists for instability depending on the nonuniformity. For a given beam the instability is quenched if the density gradient in the plasma is large. The three-wave resonant parametric instability in a finite medium, including pump depletion, was studied numerically. It was found that after transients the system settles down into a dynamic stationary equilibrium. While analytically many such equilibria exist, it was found that only one of those is stable. The underlying physical mechanisms of parametric instabilities were explained. A new instability, arising when a magnetically confined plasma is heated by a laser beam, was investigated. The stable and unstable parameter regimes were found. Author (NSA)

N75-12799# Academy of Sciences of the Ukrainian SSR, Kiev (USSR). Inst. Teoreticheskoj Fiziki.
ELECTROMAGNETIC FLUCTUATIONS IN THE HALF-SPACE OF NONEQUILIBRIUM PLASMA
V. S. Popov and I. P. Yakimenko 1974 22 p refs In RUSSIAN
(ITF-74-23P) Avail: AEC Depository Libraries HC $4.25

The boundary value was solved for the fluctuational field in the case when the electrons drift as a whole relative to the ions. The spectral densities of the space correlations of electron, ion, and total charges were found. The frequency domains in which plasma is transparent were investigated in detail. It was indicated that the introducing of plasma boundary affects strongly the fluctuation spectrum in such domains; in particular, the possibility of the existence of new branches (in respect to the case of unbounded plasma) of critical fluctuations was predicted. Author

N75-12800# Academy of Sciences of the Ukrainian SSR, Kiev (USSR). Inst. Teoreticheskoj Fiziki.
TRANSITION PROBABILITIES, CORRELATION FUNCTIONS AND DIELECTRIC PERMITTIVITY TENSORS FOR SEMI-BOUNDED AND BOUNDED NONEQUILIBRIUM PLASMA
I. P. Yakimenko and A. G. Zagorodny 1974 28 p refs
(ITF-74-21E) Avail: AEC Depository Libraries HC $4.50

The spectral tensors of current fluctuations in the systems of uncorrelated particles and the linear response functions are derived on the basis of the transition-probability approach to the theory of nonequilibrium plasma semi-bounded or bounded in one direction. The typical cases of nonequilibrium systems are considered including the presence of directed particle flows,

external force fields and temperature anisotropy. The statement of the boundary value problem for the fluctuation fields in plasma half-space and layer is also discussed under the condition that the particles suffer the specular reflection near the boundaries. The results obtained are assigned for constructing the correlation theory of electromagnetic processes in bounded nonequilibrium plasma. Author (NSA)

N75-12801# Iowa Univ., Iowa City. Dept. of Physics and Astronomy.
NUMERICAL AND ANALYTICAL INVESTIGATION OF NONLINEAR PROPERTIES OF THE VLASOV EQUATION Progress Report
G. E. Knorr May 1974 14 p refs
(Contract AT(11-1)-2059)
(COO-2059-37) Avail: NTIS HC $3.25

In the field of microscopic plasma simulation use was made of the fact that the Vlasov equation contains an operator with a continuous eigenvalue spectrum. In order to represent that spectrum for arbitrarily long times one needs arbitrarily many degrees of freedom. This is impossible on a finite computer. The results are either recurrence problems or the rise of statistical fluctuations. In order to avoid this some entropy producing term has to be introduced. A review of papers published and topics investigated during this period is given. Author (NSA)

N75-12802# Naval Research Lab., Washington, D.C.
APPLICABILITY OF ABSORBER-RATIO METHODS TO BEAM-PLASMA SYSTEMS Interim Report
Kent A. Gerber and B. Grant Logan Aug. 1974 14 p refs
(NRL Proj. 77H02-28B; RR0110941)
(AD-785238; NRL-MR-2859) Avail: NTIS CSCL 20/9

Results of calculations are used to determine whether the absorber-film or absorber-silicon detector ratio method of plasma temperature determination is applicable to plasma-electron beam interaction experiments. Author (GRA)

N75-12803# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foregin Technology Div.
STRATIFICATION PHENOMENA IN THE POSITIVE COLUMN OF A LOW PRESSURE OXYGEN DISCHARGE
H. Sabadil 25 Jun. 1974 22 p refs Transl. into ENGLISH from Beitr. Plasmaphy. (East Germany), v. 6, no. 5, 1966 p 305-317
(AD-783054; FTD-HC-23-1385-74) Avail: NTIS CSCL 20/9

The stratification state of a positive column of a low pressure oxygen discharge was investigated in its various forms which are dependent on certain discharge conditions. The T-form of the positive column of an oxygen discharge was examined, along with the H-form in which there are discharge conditions under both positive traveling, stationary, and negative traveling strata. Observations were also made regarding the effect of nitrogen impurities on the macroscopic stratification parameter. Author

N75-12804# Toronto Univ. (Ontario). Inst. for Aerospace Studies.
SUPERSONIC EXPANSION OF NONEQUILIBRIUM PLASMAS Interim Report
O. Igra Apr. 1974 142 p refs
(Grant AF-AFOSR-2274-72)
(AD-785434; UTIAS-REVIEW-38; AFOSR-74-1501TR) Avail: NTIS CSCL 20/9

In the supersonic expansion of an ionized gas, the dominant factor in models describing the atomic processes is the recombination rate constant (K sub R). Several models describing the recombination process have been reviewed in some detail. It has been found that, depending on the adopted definition, different models will yield different values of (K sub R) for the same electron temperature and number density. A comparison of experimentally and theoretically derived values for (K sub R) has to be done with great care, as in the majority of the experiments (K sub R) is determined from the measured rate of disappeareance of free electrons. These measurements give the correct decay coefficient, but only in certain circumstances will it reduce to the correct recombination rate. It was found that the theoretically predicted values for the three-body, electron-ion-electron collisional-recombination rate are in good agreement with those measured gasdynamically in a well-defined flow. (Modified author abstract) GRA

N75-12805# New York Univ., N.Y. Dept. of Engineering and Science.
STUDY OF FIELD-PLASMA INTERACTION BY TRANSIENT TECHNIQUES Final Report
B. R. Cheo and E. E. Kunhardt Aug. 1974 88 p refs
(Grant AF-AFOSR-2226-72; AF Proj. 9751)
(AD-785404; AFOSR-74-1373TR) Avail: NTIS CSCL 20/9

Field-plasma interactions were investigated in two areas: the parametric excitation of ion-acoustic waves and the propagation of KV/cm sub-nanosecond electric field pulses (impulses) along a plasma column. In the investigations of parametric excitation of ion acoustic waves, the authors center around both the above and below threshold conditions. The study of impulse propagation was studied using a high amplitude (about 2KV/cm) fast (about 200 ps) pulse generator called bouncing ball generator (BBG). BBG is a home made device. The observations were made with the aid of a sampling scope. The launching structure excites mostly a transient surface wave packet whose behavior was analyzed in detail theoretically. (Modified author abstract) GRA

N75-12806# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
PLASMA ACCELERATORS
A. I. Morozov 22 Aug. 1974 25 p refs Transl. into ENGLISH from the monograph "Plazmennye Uskoriteli" USSR, 1973 p 5-15
(AD-785108; FTD-MT-24-1042-74) Avail: NTIS CSCL 20/9

The physical principles of plasma accelerators are discussed. The basic stages in the analysis of processes in plasma accelerators are defined as: (1) analysis of the mechanisms of plasma accelerators and conditions of their realization, (2) creation of a model of the accelerator as a whole taking into account the boundary conditions between the plasma abd solid bodies, and (3) analysis of the stability of the model developed. A mathematical model is presented to show the mechanisms of the acceleration of ions. Some examples of plasma accelerators are examined to show differences in their principles of operation. Author

N75-12807# Tennessee Univ. Space Inst., Tullahoma.
MHD ENERGY CONVERSION Final Report, 1 Sep. 1968 - 31 Aug. 1974
John B. Dicks Aug. 1974 28 p refs
(Contract F44620-69-C-0031; AF Proj. 6813; AF Proj. 9752)
(AD-785419; AFOSR-74-1503TR) Avail: NTIS CSCL 20/9

Theoretical and experimental investigations were made on a number of phenomena in magnetohydrodynamics that are pertinent in the combustion gas driven MHD generators. Different types of generators of diagonal conducting wall designs were studied and a number of different fuels and seed were used in these investigations. Both liquid and solid fuels were used in the experiments. Optical measurements were made to measure the relative temperature and absolute velocity of the plasma. Three-dimensional current distributions were measured along with analysis. (Modified author abstract) GRA

N75-12808# Innsbruck Univ. (Austria). Inst. for Theoretical Physics.
INVESTIGATIONS OF PLASMA INSTABILITIES Final Report, 1 Jan. 1972 - 30 Jun. 1974
Ferdinand Cap 30 Jun. 1974 28 p refs
(Contract F44620-72-C-0016; AF Proj. 9752)
(AD-784967; UNICP-FR74; AFOSR-74-1298TR) Avail: NTIS CSCL 20/9

Split up in 28 items, the research done in the period 1 Jan. 1972-30 June 1974 in the field of non-linear theory, plasma instabilities, including stabilization and saturation, experimental results in Q-machine and hollow cathode, wave excitation and conversion, stability criteria are described. 39 publications and 33 reports are cited. GRA

N75-12809# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
DYNAMIC OF THE CURRENT SHEATH IN A PULSED COAXIAL INJECTOR

Yu. A. Valkov and V. S. Molchanov 21 Aug. 1974 24 p refs Transl. into ENGLISH from the book "Plazmennye Uskoriteli" USSR, 1973 p 233-234
(FTD Proj. T74-04-03)
(AD-785115; FTD-MT-24-1086-74) Avail: NTIS CSCL 20/9

Pulsed coaxial plasma accelerators are discussed. Results are given of the measurement of the distributions of electrical and magnetic fields in the entire space of the channel and for all points in time, density distribution of the inert gas, density of charged particles, and luminous intensity of lines H alpha, H beta, and CII. By calculations the distributions of temperature, current density, conductivity, and velocities of ions and electrons were obtained. GRA

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers*.

N75-12810* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
DETERMINING PARTICLE DENSITY USING KNOWN MATERIAL HUGENIOT CURVES Patent
John D. DiBattista, inventor (to NASA) Issued 22 Oct. 1974 18 p Filed 5 Jun. 1973 Supersedes N73-26838 (11 - 17, p 2082)
(NASA-Case-LAR-11059-1; US-Patent-3,842,656; US-Patent-Appl-SN-367294; US-Patent-Class-73-32R; US-Patent-Class-73-432PS) Avail: US Patent Office CSCL 20H

A method is detailed to determine the density of particles wherein the closing velocity is known between the impacting particles and a plate of known material. Either the shock wave velocity or the material velocity produced in the plate upon impact by an unknown material particle is determined and compared with the corresponding shock wave or material velocity that would by produced by different known material particles having the same closing velocity upon impact with the plate. The unknown material particle density is derived by obtaining a coincidence of the shock wave velocity or material velocity conditions initially produced upon impact between the known material plate and one of the different material particles and from the fact that shock wave velocity and material velocity are ordered on the impacting particle material density alone.
Official Gazette of the U.S. Patent Office

N75-12811# Technische Universitaet, Munich (West Germany).
MASS AND ENERGY DEPENDENCE OF SECONDARY ELECTRON EMISSION FROM METALS, STUDIED FOR IONS IN 22 ELEMENTS FROM LITHIUM TO LEAD Ph.D. Thesis [MASSEN UND ENERGIEABHAENGIGKEIT DER KINETISCHEN SEKUNDAERELEKTRONENEMISSION VON METALLEN, UNTERSUCHT FUER IONEN VON 22 ELEMENTEN IM BEREICH VON LITHIUM BIS BLEI]
Udo Fehn 1973 24 p refs In GERMAN
Avail: NTIS HC $3.25

The effects of ion mass and ion energy on secondary electron emission from various target materials are studied by mass spectrometry. It is shown that ion velocity, the number of ions and electrons in the target, and the electron configurations of ions and target atoms are the main parameters that determine secondary emission. Transl. by G.G.

N75-12812*# California Univ., Berkeley. Dept. of Electrical Engineering and Computer Sciences.
AC ELECTRONIC TUNNELING AT OPTICAL FREQUENCIES
S. M. Faris, B. Fan, and T. K. Gustafson [1974] 13 p refs (Grants NGR-05-003-559; NSF GK-33939)
(NASA-CR-140802) Avail: NTIS HC $3.25 CSCL 20L

Rectification characteristics of non-superconducting metal-barrier-metal junctions deduced from electronic tunneling have been observed experimentally for optical frequency irradiation of the junction. The results provide verification of optical frequency Fermi level modulation and electronic tunneling current modulation. Author

N75-12813# State Univ. of New York, Binghamton. Dept. of Physics.
ABSENCE OF STRANGENESS-CHANGING, NEUTRAL CURRENT EFFECTS FROM THE SYMMETRIC QUARK MODEL
C. A. Nelson [1974] 11 p refs
Avail: NTIS HC $3.25

It is shown that the symmetric quark model with Bose quarts or as a three-triplet model with perfect SU(3) double prime (i.e. color) symmetry, supplemented by current algebra and pion PCAC provides an alternative to introduction of a rho prime charmed quark for banishing the absolute value of delta S = 2, delta Q = 0 nonleptonic effects to order (Gs). This mechanism is distinguished by the presence of such effects at high energies, to order (Gs) and/or (Gs) (Gt). Semileptonic the absolute value of delta S = 1, delta Q = 0 effects can be simply avoided by coupling the associated Z's to heavy leptons. Author

N75-12814# Los Alamos Scientific Lab., N.Mex.
SUPERCONDUCTING MAGNETIC ENERGY STORAGE
H. L. Laquer 1974 22 p refs Presented at the 5th Intern. Cryogenic Eng. Conf., Kyoto, Japan, 7-10 May 1974
(Contract W-7405-eng-36)
(LA-UR-74-737; Conf-740509-7; ICEC-5) Avail: NTIS HC $3.25

Four distinct areas are discussed in which superconducting magnetic energy storage can be applied. Differences in energy transfer times place different requirements on the storage oil, on the switch or transfer element and on the energy losses in the superconductor. Designs and experiments in one of these areas with 2 to 300 kJ units, and analysis and plans for an installation that is to provide 250 MJ of plasma compression energy for the theta-pinch controlled thermonuclear fusion test reactor are discussed. Those elements of inductive storage that need further development before a theta-pinch fusion reactor can become economically competitive are mentioned. Size and costs of the energy storage components of these systems are compared with similar and with larger inductive storage systems that are to interact reversibly with electric utility networks.
Author (NSA)

N75-12815# Oak Ridge National Lab., Tenn.
APPROXIMATE FOKKER-PLANCK OPERATORS FOR COULOMB COLLISIONS
D. J. Sigmar, J. F. Clarke, and S. P. Hirshman Jun. 1974 36 p refs
(Contract W-7405-eng-26)
(ORNL-TM-4605) Avail: NTIS HC $3.75

Analytically tractable approximations are developed for C sub ee (or C sub ii) and C sub ie, where C sub ab is the operator for collisions of species a on b. Whereas the pitch angle derivatives delta/delta theta contained in these operators are kept rigorously, a global method of describing the effect of velocity derivatives delta/delta v in algebraic terms is developed. The resultant form for C sub ie when generalized to the case of heavy ions colliding with light ions enables the analytic solution of the multi-ion species transport problem. The result for C sub ee (or C sub ii) agrees with a previously given heuristic derivation. These operators obey the conservation laws. Their use is restricted to kinetic equations of the generalized Spitzer-Haerm type. The neoclassical transport problem for plasmas in toroidal magnetic confinement in the long mean free path ('banana') regime is included.
Author (NSA)

N75-12816# New York Univ., N.Y. Courant Inst. of Mathematical Sciences.
ELECTRONIC STRUCTURE AND BONDING OF ACTINIDE COMPLEXES
J. W. Moskowitz May 1974 23 p refs
(Contract AT(11-1)-3077)
(COO-3077-53) Avail: NTIS HC $3.25

The electronic structure of actinide complexes was studied. Accurate Hartree-Fock self-consistent-field computations were performed in the recently developed X sub alpha multiple-scattering approximation. The goal is to interpret the optical

and magnetic properties of the actinide compounds and to estimate the degree to which covalency must be taken into account in order to understand the role of the 5f electrons in both molecular and metallic bonding. The compounds will include the actinyl ions as well as the hexafluoride and oxide complexes of uranium, neptunium, and plutonium. In addition, it is proposed to investigate small metallic clusters that reflect the complex geometry of the unit cell found in the metallic phase of the actinide elements. Author (NSA)

N75-12817# Sandia Labs., Livermore, Calif.
QUICKE2: A ONE-DIMENSIONAL CODE FOR CALCULATING BULK AND VACUUM EMITTED PHOTOCOMPTON CURRENTS
T. A. Dellin and C. J. MacCallum Apr. 1974 50 p refs
(Contract AT(29-1)-789)
(SLL-74-218) Avail: NTIS HC $3.75

The theory and operational features of the one-dimensional code QUICKE2 are described. The code is used to calculate the bulk and vacuum-emitted photo-Compton current of electrons generated in a material exposed to photons with energies from 1 keV to 10 MeV and arbitrary angle of incidence. The rapid and easy-to-use calculational technique is based on analytical solutions to the transport equation modeling electron multiple scattering and slowing down. Author (NSA)

N75-12818# Minnesota Univ., Minneapolis. Dept. of Chemical Engineering and Materials Science.
SUPERCONDUCTING PROPERTIES OF BULK AND THIN FILM Al5 COMPOUNDS
Ramasubramanian Somasundaram, Louis E. Toth, and Hermann Spitzer 1973 118 p refs
(Contract DAAK02-70-C-0181)
(AD-785014) Avail: NTIS CSCL 20/12

Superconducting properties of cast and heat treated alloys of niobium with Al, Ge and Ga were studied as a function of composition and heat treatment. Structure and composition of alloys were studied with X-rays, metallography and electron-microprobe analysis. These studies indicated that the improvement in transition temperature resulted from changes in composition of the Al5 phase which occur during heat treatment. Thin films of some of the Al5 Nb alloys were sputtered as a function of applied voltage and substrate temperature from a compound target. Sputtered films of Nb-Sn with a Tc of 15.6 K and Nb-Ge films with a Tc of 17 K were obtained. Sputtered films of Nb-Al, Nb-Ga and Nb-Al-Ge had poor superconducting properties mainly due to the absence of the Al5 phase. The results indicated that the sputtering variables affect the superconducting properties by varying the structure and composition of the film. (Modified author abstract) GRA

N75-12819# Colorado State Univ., Fort Collins. Dept. of Physics.
ELECTRICAL CONDUCTION THROUGH THERMAL AND ANODIC OXIDES OF INDIUM ANTIMONIDE
Y. K. Chan, C. W. Wilmsen, and G. C. Vasbinder 15 Aug. 1974 18 p refs
(Contract N00014-67-A-0299-0017; NR Proj. 372-305)
(AD-785078; SR-3) Avail: NTIS CSCL 20/12

Metal-insulator-semiconductor (MIS) devices formed with InSb are finding application as infrared image converters and detectors and as a voltage controlled surface wave delay line. These MIS devices require a stable insulating layer with high resistance and breakdown strength. This investigation has been conducted in order to better evaluate the oxide as a possible insulator for InSb MIS devices. The characteristics of current flow through thermally and anodically grown oxides of vapor deposited and bulk InSb are reported. The thermally grown oxides have low resistance similar to In2O3, but the anodic oxides are insulating and the current flow is characteristic of Schottky emission. GRA

N75-12820# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
EXCITATION OF PLANE THERMOELASTIC WAVES IN A LAYER WITH A FINITE RATE OF HEAT PROPAGATION
V. G. Cheban and P. F. Sabodash 21 Aug. 1974 13 p refs
Transl. into ENGLISH from Prikl. Mat. Programmirovanie (USSR), no. 4, 1971 p 104-111
(AD-785190; FTD-HT-23-1783-74) Avail: NTIS CSCL 20/12

A generalization is discussed for the case of a plane-parallel elastic plate of finite thickness with stress free boundaries. The one-dimensional problem of the heat propagation and repeated reflection of plane thermoelastic waves has a nonstationary nature and is solved in linear approximation (incoherent thermal conductivity). Author

N75-12821# Stanford Univ., Calif. Standard Electronics Labs.
ELECTRONIC STRUCTURE OF HARD SUPERCONDUCTORS
William E. Spicer, Joseph C. McMenamin, and Ingolf Lindau 31 Aug. 1974 9 p refs
(Grant AF-AFOSR-2249-72; AF Proj. 9764; AF Proj. 6813)
(AD-785421; AFOSR-74-1374TR) Avail: NTIS CSCL 20/12

The work on MoS2 has contributed strongly to major revisions of the widely accepted bond models for the layered dichaldogenides. Work on Nb, determining the electronic structure and establishing procedures for cleaning the surface, has been completed. Preliminary data on high transition temperature alloys have been obtained. The development of a technique for cleaning Nb makes it possible to perform meaningful studies on high temperature Nb based superconductors. Author (GRA)

N75-12822# City Univ. of New York. Research Foundation.
STRUCTURE DEPENDENT PROPERTIES OF THIN FILM SUPERCONDUCTORS Final Report
J. Marion Dickey Aug. 1974 9 p refs
(Grant AF-AFOSR-2292-72; AF Proj. 9764; AF Proj. 6813)
(AD-785424; AFOSR-74-1377TR) Avail: NTIS CSCL 20/12

The surface properties of superconductors have been studied using low energy electron diffraction and Auger spectroscopy. Thin films of superconducting compounds have been produced by evaporating thin layers of aluminum and tin onto niobium and then annealing at a suitable temperature. The resulting films have a transition temperature approaching that of the bulk compounds. The interaction between niobium and nitrogen has been investigated, and the sticking coefficients measured. N forms an order 5x5 structure. The production of thin skins of a superconducting compound on a substrate of one of the components has been shown to be a viable technique and could have many useful applications. The conditions for growth of the skin are critical and not all compounds could be so formed. Author (GRA)

N75-12823# Watervliet Arsenal, N.Y.
DETERMINATION OF CONTAINED FUNCTIONS IN THE MODIFIED-PLANE-WAVE METHOD OF BAND STRUCTURE CALCULATION
D. M. Gray Jul. 1974 105 p refs
(DA Proj. 1T1-61101-A-91A)
(AD-785515; WVT-TR-74012) Avail: NTIS CSCL 20/12

The Modified Plane Wave (MPW) method of calculating electronic band structures is a variational procedure in which the eigenfunctions are linear expansions of atomic-like functions (a.l.f.'s) and plane waves. In Part I it is shown how one uses I character tables in conjunction with the ordinary point group character tables to determine what types of a.l.f.'s are contained in a particular group representation. Examples are given using the Cu3Au and CsCl structures. In Part II a perturbation involving a change in lattice symmetry is introduced. Using an example in which the lattice changes from face-centered cubic (fcc) to simple tetragonal, the author shows how to obtain the contained functions for the new lattice. (Modified author abstract) GRA

N75-12824# Pittsburgh Univ., Pa. Dept. of Physics.
SURFACE AND BULK ELECTRONIC PROPERTIES OF MAGNETIC MATERIALS Final Report, 1 Mar. 1971 - 30 Apr. 1974
Frederic Keffer 17 Aug. 1974 10 p refs
(Grant AF-AFOSR-2028-71; AF Proj. 9764)
(AD-785426; AFOSR-74-1375TR) Avail: NTIS CSCL 20/12

The report includes brief summaries of theoretical studies of pure and impurity-doped insulators and metals with the object of understanding the sources of energy loss in magnetic materials used in AC instrumentation. Also studied are surface effects

on magnetic solids, the passage from a non-magnetic to a magnetic state or between different magnetic states (magnetic phase transitions), the energetics of magnetic alloying, and the response of complex magnetic materials to infrared and microwave radiation. (Modified author abstract) GRA

N75-12825# Case Western Reserve Univ., Cleveland, Ohio. Dept. of Physics.
INTERMEDIATE STATE IN SUPERCONDUCTORS Final Report
David E. Farrell 31 Aug. 1974 10 p refs
(Grant AF-AFOSR-2341-72; AF Proj. 9764)
(AD-785484; AFOSR-74-1371TR) Avail: NTIS CSCL 20/12

The extensive theoretical and experimental program described in this report has substantially increased our understanding of many aspects of the intermediate state in superconductors. Fundamental areas contributed to include: basic energetics, growth and stability of flux structures, local magnetic fields in the intermediate state, surface energies of zinc, aluminum and mercury and electrically and thermally induced flux motion. In addition, a related technical investigation of the resistance of normal metal contacts on superconductors holds promise of extensive application to the practically important area of type II superconductivity. Author (GRA)

N75-12826# Norges Tekniske Hoegskole, Trondheim. Div. of Physical Electronics.
WAVE INTERACTIONS IN LOSSY PERIODIC MEDIA Final Report
T. Wessel-Berg Sep. 1973 44 p refs
(Contract DAJA37-72-C-4116)
(AD-784660; ERO-1449) Avail: NTIS CSCL 20/12

The first part of the report presents a general analysis of parametric effects in lossy media. The main effect of the loss is to relax the usual phase matching condition for parametric interaction. In the lossy case the corresponding response condition depends primarily on the attenuation factor of the most strongly damped mode. The second part of the report discusses applications of the parametric principles for amplification of surface carrier waves in semiconductors. (Modified author abstract) GRA

N75-12827# Calspan Corp., Buffalo, N.Y.
INFRARED RADIATION FROM H2O, CO2 OR NH3 COLLISIONALLY EXCITED BY N2, O OR Ar Final Report, Apr. 1972 - Jan. 1974
Michael G. Dunn, George T. Skinner, and Charles E. Treanor Jul. 1974 79 p refs
(Contract F04611-72-C-0035; DARPA Order 1857)
(AD-785412; AFRPL-TR-74-30) Avail: NTIS CSCL 07/4

The experiment described was designed to elicit the infrared radiative properties of molecules of H2O, CO2 or NH3 that have been involved in a single high-energy collision with N2, O, or Argon. A pressure-driven reflected-shock tunnel was used to produce N2, O, and Ar at sufficiently low density that the effect of single collisions could be observed. Excited states are generated at one streamwise location and the associated radiation intensity viewed by an infrared detector at a location farther downstream. The experimental apparatus and diagnostic techniques used to obtain these results are described. The data reduction procedure is discussed which was used to convert the detector output to the appropriate values of the ratio of cross section for collisional excitation to the lifetime of the participating excited state and the excitation cross section. Experimental data for the interaction of N2 -H2O, N2 -CO2, N2-NH3, O-H2O, and Ar-H2O are presented. The appendix provides some semi-empirical formulae which permit correlation of vibrational relaxation data and collisional excitation cross sections. GRA

N75-12699 Toronto Univ. (Ontario). Dept. of Electrical Engineering.
FABRICATION TECHNOLOGY AND MATERIALS
V. M. Ristic *In* Commun. Res. Centre Proc. of the Can. Workshop on Acoustic Surface Waves Jun. 1974 3 p (For availability see N75-12696 03-70)

N75-12840 Joint Publications Research Service, Arlington, Va.
DEVELOPMENT OF MICROWAVE SEMICONDUCTORS
Jerzy Klamka *In its* Transl. on Eastern Europe: Sci. Affairs, no. 438 (JPRS-63447) 15 Nov. 1974 p 34-44 refs Transl. into ENGLISH from Elektron. (Warsaw), no. 7-8, Jul.-Aug. 1974 p 320-326 (For availability see N75-12836 03-81)

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

N75-12828# Columbia Univ., New York. Dept. of Physics.
VALUE OF FUNDAMENTAL CONSTANTS
G. Parisi 1974 8 p refs Sponsored by AEC
(COO-2271-34) Avail: NTIS HC $3.25

The way in which renormalized coupling constants depend on the cutoff in a renormalized quantum field theory is studied. Assuming that the cutoff is connected with quantum gravity effects, relations are found between the fine structure constant, the total cross section positron-electron into hadrons, and the weak interaction angle. Author (NSA)

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

No abstracts in this category.

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N75-12829# Joint Publications Research Service, Arlington, Va.
TRANSLATIONS ON EASTERN EUROPE: SCIENTIFIC AFFAIRS, NO. 439
20 Nov. 1974 29 p Transl. into ENGLISH from several articles from East European organizations
(JPRS-63487) Avail: NTIS HC $3.75

Computer utilization by some of the leading East European scientific organizations and institutions is described. For individual titles, see N75-12830 through N75-12831.

N75-12830 Joint Publications Research Service, Arlington, Va.
KATOWICE MAIN INFORMATION SCIENCE CENTER DESCRIBED
Krystyn Bernatowicz *In its* Transl. on Eastern Europe: Sci. Affairs, No. 439 (JPRS-63487) 20 Nov. 1974 p 8-13 Transl. into ENGLISH from Imformatyka (Warsaw), no. 7-8, Jul.-Aug. 1974 p 40-45 (For availability see N75-12829 03-81)

Features of the Katowice, Poland Information Science Center are discussed in terms of building layout, personnel, and computer systems hardware. A.A.D.

N75-12831 Joint Publications Research Service, Arlington, Va.
INSTALLATION OF R-20 COMPUTER DESCRIBED c82
Krystyn Bernatowicz *In its* Transl. on Eastern Europe: Sci. Affairs, No. 439 (JPRS-63487) 20 Nov. 1974 p 14-15 Transl. into ENGLISH from Informatyka (Warsaw), no. 7-8, Jul.-Aug. 1974 p 46-49 (For availability see N75-12829 03-81)

Elements of the R-20 computer system installed in the Information Processing Center of the Communication Equipment Plant in Rzeszow, Poland are explained insofar as system hardware, capabilities, and personnel training benefits. A.A.D.

N75-12832# Joint Publications Research Service, Arlington, Va.
TRANSLATIONS ON EASTERN EUROPE: SCIENTIFIC AFFAIRS, NO. 440
3 Dec. 1974 22 p Transl. into ENGLISH from several articles from East European organizations
(JPRS-63573) Avail: NTIS HC $3.25

A radio spectrograph onboard Intercosmos-Kopernik 500 is discussed; this spectrometer was used to measure radio waves from the solar corona. A thyristor dc electric drive with time proportional speed control is described, along with an electric tow truck for aircraft. For individual titles, see N75-12833 through N75-12835.

N75-12833 Joint Publications Research Service, Arlington, Va.
OPERATION OF POLISH EQUIPMENT USED ON INTERKOSMOS SPACE SATELLITE DESCRIBED **c15**
Jan Hanasz *In its* Transl. on Eastern Europe: Sci. Affairs, no. 440 (JPRS-63573) 3 Dec. 1974 p 1-9 Transl. into ENGLISH from Urania (Warsaw), no. 10, Oct. 1974 p 290-298 (For availability see N75-12832 03-81)

A transmitter onboard Intercosmos-Kopernik 500 satellite provided routine information about the functioning of the Polish research equipment. This equipment consisted of a radiospectrograph which measured radiation in the wavelength range of 50 to 500 meters. This radiation was sporadic radio waves of the solar corona. The radiospectrograph's antenna consisted of two crossed dipoles spanning 15 meters. J.A.M.

N75-12834 Joint Publications Research Service, Arlington, Va.
THYRISTOR dc ELECTRIC DRIVE WITH TIME-PROPORTIONAL SPEED CONTROL **c33**
Aleksandur Ivanov and Prodan Prodanov *In its* Transl. on Eastern Europe: Sci. Affairs, no. 440 (JPRS-63573) 3 Dec. 1974 p 10-12 Transl. into ENGLISH from Voenna Tekhn. (Sofia), no. 9, 1974 p 35-36 (For availability see N75-12832 03-81)

The reversible thyristor dc electric drive with time proportional speed control was proposed for use in low power ship screws, elevators, and conveyor belts. The power unit includes three thyristors (operating, switching, and auxiliary), commutating capacitor, autotransformer, and an armature of an electric motor. The pulse converter control system is described. Tests of the laboratory model show that the pulse converter operates reliably with supply voltage fluctuation in a range of + or - 15% of rate value. J.A.M.

N75-12835 Joint Publications Research Service, Arlington, Va.
ELECTRIC TOW TRUCK FOR PLANES DESCRIBED **c09**
Petur Milushev and Bonyu Teknedzhiev *In its* Transl. on Eastern Europe: Sci. Affairs, no. 440 (JPRS-63573) 3 Dec. 1974 p 13-15 Transl. into ENGLISH from Voenna Tekhn. (Sofia), no. 9, 1974 p 34-35 (For availability see N75-12832 03-81)

An electric plane towing truck was developed, consisting of a frame, back axle with differential and electric motor to drive the rear wheels, storage battery, self-guided front wheel, hoist, brake system, control device, and draw bar. The fork of the electric tow truck connects quickly and conveniently to the nose wheel of the aircraft. The hydraulic apparatus hoists the entire forward end of the aircraft, together with the nose wheel, for ease in towing and to reduce the friction. J.A.M.

N75-12836# Joint Publications Research Service, Arlington, Va.
TRANSLATIONS ON EASTERN EUROPE: SCIENTIFIC AFFAIRS, NO. 438
15 Nov. 1974 66 p refs Transl. into ENGLISH from several articles from East European organizations
(JPRS-63447) Avail: NTIS HC $4.25

The history of achievements recorded by Polish research establishments in optoelectronics, semiconductor and solid state electronics, and laser technology is discussed. For individual titles, see N75-12837 through N75-12841.

N75-12837 Joint Publications Research Service, Arlington, Va.
ACHIEVEMENTS AND DEVELOPMENT PROSPECTS OF OPTOELECTRONICS **c74**
Bohdan Mroziewicz *In its* Transl. on Eastern Europe: Sci. Affairs, no. 438 (JPRS-63447) 15 Nov. 1974 p 6-25 refs Transl. into ENGLISH from Elektron. (Warsaw), no. 7-8, Jul.-Aug. 1974 p 299-307 (For availability see N75-12836 03-81)

The history of the development of optoelectronics in Poland, and the actual status of its advancement as compared to the overall level of semiconductor electronics technology is discussed. A.A.D.

N75-12838 Joint Publications Research Service, Arlington, Va.
DEVELOPMENT OF SOLID-STATE MICROWAVE ELECTRONICS **c33**
Adam Smolinski *In its* Transl. on Eastern Europe: Sci. Affairs, no. 438 (JPRS-63447) 15 Nov. 1974 p 26-29 refs Transl. into ENGLISH from Elektron. (Warsaw), no. 7-8, Jul.-Aug. 1974 p 316-317 (For availability see N75-12836 03-81)

Research contributions made by Polish scientists and engineers in the field of solid state microwave electronics are discussed, with particular emphasis on the application of millimeter wave frequencies. The development of hybrid and monolithic self-contained systems is also considered. A.A.D.

N75-12839 Joint Publications Research Service, Arlington, Va.
DEVELOPMENT OF INTEGRATED CIRCUITS **c33**
Andrzej Ambroziak *In its* Transl. on Eastern Europe: Sci. Affairs, no. 438 (JPRS-63447) 15 Nov. 1974 p 30-33 refs Transl. into ENGLISH from Elektron. (Warsaw), no. 7-8, Jul.-Aug. 1974 p 318-319 (For availability see N75-12836 03-81)

The history of the development of microelectronic self-contained electronic systems is discussed, with emphasis on research in integrated circuitry. The establishment of the Polish Scientific Production Center of Semiconductors is described, and several of its research achievements are cited for their particular contributions to monolithic and hybrid circuit technology. A.A.D.

N75-12840 Joint Publications Research Service, Arlington, Va.
DEVELOPMENT OF MICROWAVE SEMICONDUCTORS **c76**
Jerzy Klamka *In its* Transl. on Eastern Europe: Sci. Affairs, no. 438 (JPRS-63447) 15 Nov. 1974 p 34-44 refs Transl. into ENGLISH from Elektron. (Warsaw), no. 7-8, Jul.-Aug. 1974 p 320-326 (For availability see N75-12836 03-81)

Work in the field of microwave semiconductors is summarized for several Polish institutes engaged in electronics research and engineering. Specific developments are described for the following devices: (1) varactor diodes; (2) Schottky diodes; (3) avalanche diodes; and (4) Gunn diodes. Examples are given of the application of microwave semiconductors to advanced communications equipment. A.A.D.

N75-12841 Joint Publications Research Service, Arlington, Va.
DEVELOPMENT OF LASER TECHNOLOGY **c36**
Herman Klejman *In its* Transl. on Eastern Europe: Sci. Affairs, no. 438 (JPRS-63447) 15 Nov. 1974 p 45-64 Transl. into ENGLISH from Elektron. (Warsaw), no. 7-8, Jul.-Aug. 1974 p 333-341 (For availability see N75-12836 03-81)

Studies in the field of quantum electronics undertaken in Polish research establishments are described insofar as they are related to the development of laser technology for medical, military, and industrial purposes. Early models of Polish lasers are shown, and research details are given for many of the more advanced laser systems, including ruby lasers, neodymium glass lasers, the laser coagulator, carbon dioxide lasers, helium-neon lasers, and ion-argon lasers. Applications of laser technology are fully described, and photographs are provided of all the apparatuses mentioned. A.A.D.

N75-12842*# Houston Univ., Tex. Dept. of Physics.
A STUDY OF THE OPERATION OF SELECTED NATIONAL RESEARCH FACILITIES
Melvin Eisner 1974 70 p
(Contract NAS9-12692)
(NASA-CR-140322) Avail: NTIS HC $4.25 CSCL 05A

The operation of national research facilities was studied. Conclusions of the study show that a strong resident scientific staff is required for successful facility operation. No unique scheme of scientific management is revealed except for the obvious fact that the management must be responsive to the users needs and requirements. Users groups provide a convenient channel

through which these needs and requirements are communicated. Author

N75-12843# California Univ., Berkeley. Inst. of Industrial Relations.
EMPIRICAL FINDINGS AND SUGGESTIONS FOR FUTURE RESEARCH ON ORGANIZATIONAL COMMUNICATION
Karlene H. Roberts and Charles A. OReilly, III Aug. 1974 179 p refs
(Contract N00014-69-A-0200-1054)
(AD-785002; TR-6) Avail: NTIS CSCL 05/10

The report is a companion piece to Technical Report No. 7 (AD-785 003) from this grant. It reviews the research in organizational communication completed and in progress suggests some directions future research might take, and mentions how the results of the research might be applied in the Navy. The report reviews two theoretical reviews of the literature in organizational communication, the development of a framework for guiding organizational behavioral research, the development and inclusion of an instrument for assessing individual perceptions about organizational communication, and seventeen investigations based on field data and laboratory studies of organizational communication. (Modified author abstract) GRA

N75-12844# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
SOME CONSEQUENCES OF RAPID MANAGERIAL SUCCESSION IN COMPLEX ORGANIZATIONS: A VALIDATION STUDY M.S. Thesis
William R. Bennett and James S. Childress Aug. 1974 127 p refs
(AD-785442; SLSR-6-74B) Avail: NTIS CSCL 05/9

Managerial succession, or the process by which managers come and go in a large organization, is thought to have significant effects on both the organization and on the attitudes of the managers involved. Previous research indicated that one set of attitudes affected by the managerial succession process is that set concerning organizational identification, or the degree to which the manager incorporates into his identity important organizational beliefs, attitudes, and values. Prior research had concluded that these attitudes of identification were affected by differences in tenure (length of time) in the organization or subunit, and differences in rates of succession (indicative of mobility). The objective of this research was to determine if such relationships held true in a population consisting of company-grade aircraft maintenance officers serving at squadron level in selected major commands. Attitudes of identification were measured with the Air Force, with the major command, and with the squadron of assignment. (Modified author abstract) GRA

N75-12845# Texas Univ., Austin. Center for Cybernetic Studies.
GENERALIZATION OF DOMINATION STRUCTURES AND NONDOMINATED SOLUTIONS IN MULTICRITERIA DECISION MAKING
Ken Bergstresser, A. Charnes, and P. L. Yu Jul. 1974 18 p refs
(Contracts N00014-67-A-0126-0008;
N00014-67-A-0126-0009; NR Proj. 047-021)
(AD-784418; CS-185) Avail: NTIS CSCL 12/2

The concepts of domination structures and nondominated solutions are important in tackling multicriteria decision problems. The authors relax Yu's requirement that the domination structure at each point of the criteria space be a convex cone and give results concerning the set of nondominated solutions for the case where the domination structure at each point is a convex set. A practical necessity for such a generalization is discussed. The authors also present conditions under which a locally nondominated solution is also a globally nondominated solution. Author (GRA)

N75-12846# Defense Documentation Center, Alexandria, Va.
PERSONNEL MANAGEMENT Report Bibliography, Jan. 1967 - Apr. 1974
Sep. 1974 481 p refs
(AD-785350; DDC-TAS-74-29) Avail: NTIS CSCL 05/9

The abstracts provide information emphasizing management planning and control, policies, decision making, job analysis, scheduling, selection, training, retraining, recruiting, leadership, manpower utilization, and motivation in personnel management. They also include pertinent information on the psychological aspects of human performance in behavior styles, attitudes and values in personnel management. Four computer generated indexes are included. Author (GRA)

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software*.

N75-12847# Advisory Group for Aerospace Research and Development, Paris (France).
AGARD INDEX OF PUBLICATIONS, 1952 - 1970. PART 3: AUTHOR INDEX. PART 4: ADDENDUM TO PART 1
J. Foulon, comp. Sep. 1974 66 p
(AGARD-INDEX-52/70) Avail: NTIS HC $4.25

An alphabetical listing of all authors whose papers were documented in the previously published AGARD index of Publications 1952-1970 is presented and, in addition, an addendum containing a listing of the titles of all individual papers that were omitted from the basic document is included. For Vol. 1, see N73-20973; for Vol. 2, see N73-20974. Author

N75-12848# Research Inst. of National Defence, Stockholm (Sweden).
INFORMATION THEORY ASPECTS OF LONG RANGE ANALYSES [INFORMATIONSTEORETISKA ASPEKTER PA FJAERRANALYS]
Torleiv Orhaug Nov. 1972 37 p refs In SWEDISH
(FOA-2-C-2568-E1) Avail: NTIS HC $3.75

The acquisition of information by means of long range analysis of the information aspect is reported. Information is defined as input data for decision systems, and different levels of decision making are discussed. The physical assumptions for long range analyses with statistical and dynamical fields are elaborated; acquisition of information is aimed at a generalized description of the reality or a categorization. The physical measurable quantities from radiating fields are used as input data for a categorization process. Different levels of this process are discussed; examples within the optical and radio fields serve as illustrations. Finally, mention is made of the amount of data, especially picture building long range analysis observations on a global scale, with examples taken from the ERTS program. Author

N75-12849# Research Inst. of National Defence, Sundbyberg (Sweden).
NORD DATA 72 AT HELSINKI, JUNE 1972 [NORDDATA 72 I HELSINGFORS 14 - 16 JUNI 1972]
Karl-Hugo Eriksson, Eva Koenberg, and Bjoern Skoeldstroem Jan. 1973 42 p refs In SWEDISH
(FOA-1-C-1496-M4) Avail: NTIS HC $3.75

Brief descriptions of lectures given at the conference arranged by the Finnish Data Society of the Nordic Data Union at Helsinki are represented. Topics cover: (1) current data processing; (2) data processing for the public sectors; and (3) data processing methods and technologies. Transl. by G.G.

N75-12850# Kanner (Leo) Associates, Redwood City, Calif.
OPTIMAL CONCEPTS OF FIRE PROTECTION AS A FUNCTION OF THE IMPORTANCE OF DATA PROCESSING INSTALLATIONS
A. E. Bamert 1974 32 p refs Transl. into ENGLISH from the German Presented at the 4th Intern. Seminar on Fire Protection, Zurich, 1973 Sponsored by AEC Prepared for Los Alamos Sci. Lab.
(LA-tr-74-20; Conf-731068-2) Avail: NTIS

Precautionary structural measures suitable for limiting the extent of fire damage, as well as technological means for the automatization of fire detection and extinction, are presented.

An attempt is made to place the desired extent of protection attainable by these measures in an economically justifiable relation to the importance of an electronic data processing installation. Author

N75-12851# Defense Documentation Center, Alexandria, Va.
BIBLIOGRAPHY OF BIBLIOGRAPHIES IN THE DDC COLLECTION Report Bibliography, Jan. 1972 - Feb. 1974
May 1974 450 p refs
(AD-780700/1; DDC-TAS-74-20) Avail: NTIS HC $11.25 CSCL 05/2

The bibliography is a compilation of references which were processed into the DDC data bank. It contains 316 entries covering the period January 1972 through March 1974. These citations are arranged in 19 COSATI subject categories. Author (GRA)

N75-12852# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
DATA ACQUISITION AND PROCESSING SYSTEM FOR ULTRASONIC RESEARCH M.S. Thesis
William S. Rogers, Jr. May 1974 355 p refs
(AD-785127; GE-EE-74-33) Avail: NTIS CSCL 14/2

The Air Force Materials Laboratory, Ultrasonic Research Facility at Wright-Patterson Air Force Base, Ohio, is investigating the use of ultrasonics as a tool for the nondestructive evaluation of aerospace materials. The development of a computerized data acquisition and processing system for the facility's ultrasonic research is described in this paper. The system provides the capability to sample and record electrical representations of ultrasonic wave trains reflected from a material sample under test. (Modified author abstract) GRA

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

N75-12853# Research Inst. of National Defence, Stockholm (Sweden).
DESCRIPTION OF SOME EXPERIMENTAL METHODS WITH ADAPTIVE PLANNING [BESKRIVNING AV NAGRA METODFOERSOEK MED ADAPTIV PLANERING]
Svante Holgersson Oct. 1972 50 p In SWEDISH
(FOA-P-C-8339-M3) Avail: NTIS HC $3.75

A series of trial methods with adaptive planning are carried out with the help of a model for budget simulation, the so called Army costing model. An imaginary army is used as the planning object. The tests are designed to record the results graphically. It is shown that it is possible to give a description of how freedom of action is affected when one applies different grades of adaptive planning. The development of freedom of action can also be shown to depend on the directing organization after the planning period has begun. Some complimentary tests show how the costs for an increasing degree of adaptive planning can be described. Further investigations are made into a method of explicitly taking account of different possibilities for alternative army combinations, should the need become a reality. Author

N75-12854# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
AN EXPLORATION INTO THE PRACTICES OF DCAS INDUSTRIAL SPECIALISTS IN OBTAINING CONTRACTOR PRODUCTION INFORMATION ON HIGH PRIORITY, MEDIUM VALUE CONTRACTS
James A. Engan and Robert E. Hergenroeder Aug. 1974 137 p refs
(AD-785441; SLSR-28-74B) Avail: NTIS CSCL 15/5

There are well-defined procedures for monitoring high priority, high value contracts, but no standard procedure for monitoring high priority, medium value contracts ($2500 -C/SCSC threshold). This study addresses the processes and methods used to conduct contract surveillance on high priority, medium value contracts. The study explored (1) the problems perceived by DCAS Industrial Specialists (ISs) that hinder their obtaining contractor production data, (2) what contractor production data is normally obtained by DCAS ISs, and (3) what data items are perceived by DCAS ISs as being available. (Modified author abstract) GRA

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

N75-12855# Delaware State Planning Office, Dover.
DEFINITION OF HEAVY INDUSTRY, GUIDELINES FOR ACCEPTABLE MANUFACTURING USES, AND PLAN FOR MANUFACTURING GASES IN DELAWARE'S COASTAL ZONE
Sep. 1973 76 p
Avail: NTIS HC $4.75

Legal actions to protect the coastal areas of the State of Delaware are discussed. The actions are taken to protect the natural environment of the bay and coastal areas to safeguard the use primarily for recreation and tourism. The actions seek to prohibit entirely the construction of new heavy industry in coastal areas. The functions of a control board to enforce the regulations and provide for development of resources and industries without damage to the ecology are described. Author

N75-12856# Delaware State Planning Office, Dover.
PUBLIC LAND USE CONTROLS IN DELAWARE'S COASTAL ZONE
Sep. 1973 99 p Sponsored by HUD
(Proj. CPA-DF-03-26-1001)
Avail: NTIS HC $4.75

The public land use controls being exercised by the State of Delaware to protect the coastal areas are discussed. The types of control in effect are reported. A review of the administrative procedures applied to the implementation and reinforcement of local and State land development codes and regulations is submitted. The primary faults of the land use control system are analyzed. The need coordination of capital improvements programming, land use regulations, and tax assessment policies is stressed. Author

N75-12857# Hudson Inst., Inc., Croton-on-Hudson, N.Y.
ENERGY AND SECURITY: IMPLICATIONS FOR AMERICAN POLICY Final Report
Uzi B. Arad, Michael Hudson, David Robison, Robert H. Shatz, and Barry J. Smernoff 24 Jul. 1974 179 p refs
(Contract DAHC15-73-0246)
(AD-785084; HI-1884/2-RR) Avail: NTIS CSCL 15/3

Interactions between energy policy and national security are discussed. Topic areas covered include: Energy policy options available to the U.S.; energy security problems of U.S. allies; monetary and trade implications of existing and near-term energy flows around the world; energy conservation to meet challenges of tight supplies and high prices; geopolitics of petroleum supplies; and recommendations for research on energy and security issues. GRA

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N75-12858*# Texas Univ., Houston. Health Science Center.
REMOTE SENSING UTILITY IN A DISASTER STRUCK URBAN ENVIRONMENT Annual Progress Report, 1 Oct. 1973 - 1 Dec. 1974
Marjorie Rush, Alfonso Holguin, and Sally Vernon 1 Dec. 1974

59 p refs
(Grant NGL-44-084-003)
(NASA-CR-140801) Avail: NTIS HC $4.25 CSCL 05K

A project to determine the ways in which remote sensing can contribute to solutions of urban public health problems in time of natural disaster is discussed. The objectives of the project are to determine and describe remote sensing standard operating procedures for public health assistance during disaster relief operations which will aid the agencies and organizations involved in disaster intervention. Proposed tests to determine the validity of the remote sensing system are reported. Author

N75-12859# Research Inst. of National Defence, Stockholm (Sweden).
COMPUTER PROGRAM FOR TOWN ANALYSIS. CHANGES ARISING FROM CONVERTING FROM IBM 7090 TO IBM 360/75 [DATORPROGRAM FOER STADSANALYS AENDRINGAR I SAMBAND MED KONVERTERING FRAN IBM 7090 TILL IBM 360/75]
Hans Linnros Oct. 1972 67 p In SWEDISH
(FOA-4-C-4515-A4) Avail: NTIS HC $4.25

A computer program for town analysis was described in FOA4 reports C4312-10 and C4446-18. Arising from the transfer to IBM 360/75, certain alterations, mainly in the kind of programming technique, have been carried out and are described in this report. Details for running the computer program are included. Author

N75-12860# Southern Interstate Nuclear Board, Atlanta, Ga.
RADIOACTIVE SHIPMENTS THROUGH OUR STATES: THE WEAKEST LINK?
17 May 1973 123 p refs Proceedings of the 2d Ann. Legislative Workshop, Oak Ridge, Tenn., 16-17 May 1973 Sponsored by AEC
(Conf-730588) Avail: NTIS HC $5.25

Articles are presented on radioactive materials packaging and transportation. State and federal regulations and inspection programs are discussed. J.M.S.

88 SPACE SCIENCES (GENERAL)

No abstracts in this category.

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N75-12861*# Smithsonian Astrophysical Observatory, Cambridge, Mass. Center for Astrophysics.
STELLAR CONTENT OF THE NUCLEI OF ELLIPTICAL GALAXIES DETERMINED FROM 2.3 MICRON CO BAND STRENGTHS
J. A. Frogel, S. E. Persson, M. Aaronson, E. E. Becklin, K. Matthews, and G. Neugebauer [1974] 15 p refs
(Grants NGL-05-002-207; NSF GP-35545X)
(NASA-CR-140859) Avail: NTIS HC $3.25 CSCL 03A

Observations of the luminosity sensitive CO absorption band at 2.3 micron are presented for the nuclei of 16 epsilon and SO galaxies. Preliminary data on the radial variation of the CO index in 6 galaxies are also given. The data show that the 2-u radiation from the nuclei is dominated by high luminosity stars of integrated spectral type later than K5. There is only a small variation in the CO absorption from galaxy to galaxy, and only a slight variation with measuring aperture size from 17.5 in. to 59 in. The data can be used to synthesize stellar populations for elliptical galaxy nuclei. Author

N75-12862*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
WHAT IS SPECIAL ABOUT CYGNUS X-1?
Elihu A. Boldt, Stephen S. Holt, Richard E. Rothschild (NAS-NRC), and Peter J. Serlemitsos Nov. 1974 61 p refs Submitted for publication
(NASA-TM-X-70791; X-661-74-3) Avail: NTIS HC $4.25 CSCL 03A

The X-ray evidence from several experiments is reviewed, with special emphasis on those characteristics which appear to distinguish Cygnus X-1 from other compact X-ray emitting objects. Data are examined within the context of a model in which millisecond bursts are superposed upon shot-noise fluctuations arising from events of durations on the order of a second. Possible spectral-temporal correlations are investigated which provide additional evidence that Cygnus X-1 is very likely a black hole. Author

N75-12863*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A NEW MEASUREMENT OF THE HER X-1 X-RAY PULSE PROFILE
S. S. Holt, E. A. Boldt, R. E. Rothschild, and Peter J. Serlemitsos Jan. 1974 11 p refs Submitted for publication
(NASA-TM-X-70578; X-661-74-11) Avail: NTIS HC $3.25 CSCL 03A

A triple peaked 1.24 sec. pulse profile in a 1-minute rocket borne exposure to Her X-1 was measured, in contrast to the doublepeaked profiles expected from models which maximize the X ray emission at the magnetic equator of an accreting neutron star. The profile exhibits statistically significant energy dependence, with the emission approximately greater than 12 keV having narrower peaks which lag (by approximately 5% of the pulse period) the corresponding peaks at lower energies. Approximately one third of the total emission from the source is nonpulsed. Author

N75-12864# Pennsylvania Univ., Philadelphia. Dept. of Physics.
MASS AND STABILITY OF RIGIDLY ROTATING RELATIVISTIC POLYTROPES
K. A. VanRiper 6 May 1974 80 p refs Sponsored by AEC
(COO-3071-95) Avail: NTIS HC $4.75

The energy of a rigidly rotating star is written in the first and second post-Newtonian approximation. Conditions for equilibrium and stability are derived, as well as evolutionary paths for stars shedding angular momentum or mass. For polytropic index $n > 1$, these analytic results agree with exact numerical results to within a few percent as long as the general relativity index $(P/\rho c^2)_c < 0.1$ The energy methods is applied to low-mass white dwarfs, to semi-relativistic neutron stars, and to supermassive stars. (NSA)

N75-12865*# California Univ., Berkeley. Dept. of Physics.
MICROWAVE AND INFRARED OBSERVATIONS OF MOLECULAR SPECTRA IN COMET KOHOUTEK Final Report, 10 Dec. 1973 - 9 Sep. 1974
C. H. Townes 22 Nov. 1974 26 p refs
(Grant NGR-05-003-598)
(NASA-CR-140955) Avail: NTIS HC $3.75 CSCL 03A

Transitions of the possible parent molecules H_2O, NH_3, CH_3OH, and N_2O as well as the OH radical were searched for in Comet Kohoutek (1973f) in the frequency range 22.2-25.2 GHz. These molecules were not detected but the upper limits for the optical depth, mean column density, and the production rate are derived for each of the molecules. These results are discussed and compared with the reported detections of HCN and CH_3CN emission and OH absorption. Author

N75-12866# Massachusetts Inst. of Tech., Cambridge. Research Lab. of Electronics.
OPTICAL STELLAR INTERFEROMETRY FOR SATELLITE SURVEILLANCE Final Report, 1 Jul. 1972 - 31 Oct. 1973
Paul L. Kebabian and David H. Staelin Apr. 1974 153 p refs
(Contract F33615-72-C-2129; AF Proj. 7660)
(AD-784947; AFAL-TR-73-447) Avail: NTIS CSCL 22/4

The significance of this study is that it examines the potential of optical interferometry to establish the dimensions of objects unresolvable by ordinary telescopes. The operation of this kind

of interferometer would also provide information about atmospheric properties, of use both for interferometry and for other purposes. Throughout, the analysis takes explicit account of all the relevant atmospheric properties, and evaluates numerical examples using reasonable estimates of these properties.
Author (GRA)

N75-12738* University Coll., London (England).
ASTRONOMICAL OBSERVATIONS WITH THE UNIVERSITY COLLEGE LONDON BALLOON BORNE TELESCOPE
R. E. Jennings *In* NASA. Ames Res. Center Telescope Systems for Balloon-Borne Res. Nov. 1974 p 17-25 refs (For availability see N75-12735 03-74)
CSCL 03A

N75-12739* Liege Univ. (Belgium).
THE LIEGE-BALLOON PROGRAM
R. Zander *In* NASA. Ames Res. Center Telescope Systems for Balloon-Borne Res. Nov. 1974 p 26-37 refs Sponsored in part by Belgian Govt. (For availability see N75-12735 03-74)
(Grant AF-AFOSR-2317-72)
CSCL 03A

N75-12740* Arizona Univ., Tucson.
A BALLOON-BORNE 1 METER TELESCOPE FOR FAR-INFRARED ASTRONOMY
G. G. Fazio (Harvard Coll. Obs., Cambridge, Mass.), D. E. Kleinmann (Harvard Coll. Obs., Cambridge, Mass.), R. W.. Noyes (Harvard Coll. Obs., Cambridge, Mass.), E. L. Wright (Harvard Coll. Obs., Cambridge, Mass.), and F. J. Low *In* NASA. Ames Res. Center Telescope Systems for Balloon-Borne Res. Nov. 1974 p 38-50 (For availability see N75-12735 03-74)
(Grant NGR-22-007-270)
CSCL 03A

N75-12742* University Coll., London (England). Dept. of Physics and Astronomy.
DESIGN AND PERFORMANCE OF A 39cm BALLOON-BORNE TELESCOPE
H. S. Tomlinson, W. A. Towlson, and T. E. Venis *In* NASA. Ames Res. Center Telescope Systems for Balloon-Borne Res. Nov. 1974 p 58-70 refs (For availability see N75-12735 03-74)
CSCL 20F

N75-12744* Cornell Univ., New York.
A COOLED TELESCOPE FOR INFRARED BALLOON ASTRONOMY
Carl Frederick, Michael R. Jacobson, and Martin Harwit *In* NASA. Ames Res. Center Telescope Systems for Balloon-Borne Res. Nov. 1974 p 81-90 (For availability see N75-12735 03-74)
CSCL 20F

N75-12747* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
AIROSCOPE: AMES INFRARED BALLOON-BORNE TELESCOPE
O. L. Koontz and S. G. Scott *In its* Telescope Systems for Balloon-Borne Res. Nov. 1974 p 120-135 refs (For availability see N75-12735 03-74)
CSCL 20F

N75-12749* Arizona Univ., Tucson.
LOW-BACKGROUND AIR-INFRARED TELESCOPE FOR BALLOON-BORNE INFRARED ASTRONOMY
Frank J. Low, Wade Poteet, and Robert Kurtz *In* NASA. Ames Res. Center Telescope Systems for Balloon-Borne Res. Nov. 1974 p 145-149 refs Sponsored by NASA (For availability see N75-12735 03-74)
CSCL 20F

N75-12750* Washington Univ., St. Louis, Mo. Dept. of Physics.
SKY SURVEY AT FAR INFRARED WAVELENGTHS USING A BALLOON-BORNE TELESCOPE
M. W. Friedlander, J. Goebel, and R. D. Joseph (Imperial Coll.) *In* NASA. Ames Res. Center Telescope Systems for Balloon-Borne Res. Nov. 1974 p 151-155 (For availability see N75-12735 03-74)
(Grant NGR-26-008-069)
CSCL 03A

N75-12753* Geneva Observatory (Switzerland).
THE STELLAR AND SOLAR TRACKING SYSTEM OF THE GENEVA OBSERVATORY GONDOLA
Daniel Huguenin *In* NASA. Ames Res. Center Telescope Systems for Balloon-Borne Res. Nov. 1974 p 167-175 refs (For availability see N75-12735 03-74)
CSCL 20F

N75-12754* Washington Univ., St. Louis, Mo. Dept. of Physics.
A HIGH SENSITIVITY BALLOON-BORNE X-RAY TELESCOPE SYSTEM
M. R. Pelling *In* NASA. Ames Res. Center Telescope Systems for Balloon-Borne Res. Nov. 1974 p 176-189 refs (For availability see N75-12735 03-74)
CSCL 14E

N75-12757* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
AIROSCOPE STELLAR ACQUISITION
Gordon J. Deboo, Gilbert T. Parra, and Roger C. Hedlund *In its* Telescope Systems for Balloon-Borne Res. Nov. 1974 p 225-238 (For availability see N75-12735 03-74)
CSCL 20F

N75-12759* Ball Bros. Research Corp., Boulder, Colo.
BALLOON INFRARED ASTRONOMY PLATFORM (BIRAP)
M. E. Greeb and G. A. True *In* NASA. Ames Res. Center Telescope Systems for Balloon-Borne Res. Nov. 1974 p 268-283 refs Sponsored in part by Groningen Univ., The Netherlands (For availability see N75-12735 03-74)
CSCL 03A

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N75-12867*# Stanford Univ., Calif. Inst. for Plasma Research.
ON THE USE OF GODHAVN H-COMPONENT AS AN INDICATOR OF THE INTERPLANETARY SECTOR POLARITY
Leif Svalgaard Oct. 1974 26 p refs Submitted for publication
(Grant NGR-05-020-559; Contract N00014-67-A-0112-0068; Grant NSF GA-31138)
(NASA-CR-140858; SU-IPR-596) Avail: NTIS HC $3.75 CSCL 03B

An objective method of inferring the polarity of the interplanetary magnetic field using the H-component at Godhavn is presented. The objectively inferred polarities are compared with a subjective index inferred earlier. It is concluded that no significant difference exists between the two methods. The inferred polarities derived from Godhavn H is biased by the (slp) sub q signature in the sense that during summer prolonged intervals of geomagnetic calm will result in inferred Away polarity regardless of the actual sector polarity. This bias does not significantly alter the large scale structure of the inferred sector structure.
Author

N75-12868# Barcelona Univ. (Spain). Dept. de Fisica.
NUCLEOSYNTHESIS OF LIGHT ELEMENTS IN STELLAR ATMOSPHERES AND IN INTERSTELLAR MATTER Ph.D. Thesis
Ramon Canal Masgoret 1973 19 p refs In SPANISH
Avail: NTIS HC $3.25

The sources are discussed for the abundant presence of the light nuclei D, Li-6, Li-7, Be-9, B-10, and B-11 in meteorites, solar photosphere, stellar atmospheres, and cosmic radiation. The effects of proton, and gamma fluxes on nucleosynthesis are calculated for a confinement phase, and an escape phase in an

autogenetic model. It is concluded that the autogenetic theory explains, very satisfactorily, all the abundances observed for young stars. Transl. by F.O.S.

N75-12869*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
JUPITER RADIATION BELT MODELS (JULY 1974)
Neil Divine 15 Nov. 1974 15 p refs
(Contract NAS7-100)
(NASA-CR-140845; JPL-TM-33-715) Avail: NTIS HC $3.25 CSCL 03B

Flux profiles which were derived from data returned by Pioneer 10 during Jupiter encounter, form the basis for a new set of numerical models for the energy spectra of electrons and protons in Jupiter's inner magnetosphere. Author

N75-12870*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
JUPITERS RADIATION BELTS AND THEIR EFFECTS ON SPACECRAFT
Richard H. Parker, Edward L. Divita, and Gunter Gigas 15 Oct. 1974 42 p refs
(Contract NAS7-100)
(NASA-CR-140841; JPL-TM-33-708) Avail: NTIS HC $3.75 CSCL 03B

The effects of electron and proton radiation on spacecraft which will operate in the trapped radiation belts of the planet Jupiter are described, and the techniques and results of the testing and simulation used in the radiation effects program are discussed. Available data from the Pioneer 10 encounter of Jupiter are compared with pre-encounter models of the Jupiter radiation belts. The implications that the measured Jovian radiation belts have for future missions are considered. Author

N75-12871*# California Univ., Berkeley. Space Sciences Lab.
LUNAR PARTICLE SHADOWS AND BOUNDARY LAYER EXPERIMENT: PLASMA AND ENERGETIC PARTICLES ON THE APOLLO 15 AND 16 SUBSATELLITES Final Report
Kinsey A. Anderson, L. M. Chase, R. P. Lin, J. E. McCoy, and R. E. McGuire 28 Jun. 1974 103 p refs
(Contract NAS9-10509)
(NASA-CR-140371; SSL-Ser-15-Issue-31) Avail: NTIS HC $5.25 CSCL 03B

The lunar particle shadows and boundary layer experiments aboard the Apollo 15 and 16 subsatellites and scientific reduction and analysis of the data to date are discussed with emphasis on four major topics: solar particles; interplanetry particle phenomena; lunar interactions; and topology and dynamics of the magnetosphere at lunar orbit. The studies of solar and interplanetary particles concentrated on the low energy region which was essentially unexplored, and the studies of lunar interaction pointed up the transition from single particle to plasma characteristics. The analysis concentrated on the electron angular distributions as highly sensitive indicators of localized magnetization of the lunar surface. Magnetosphere experiments provided the first electric field measurements in the distant magnetotail, as well as comprehensive low energy particle measurements at lunar distance. Author

N75-12872*# California Inst. of Tech., Pasadena.
THE GENERATION OF GRAVITATIONAL WAVES. 1. WEAK-FIELD SOURCES: A PLUG-IN-AND-GRIND FORMALISM
Kip S. Thorne and Sandor J. Kovacs [1974] 54 p refs
(Grants NGR-05-002-256; NSF GP-36687X)
(NASA-CR-140864) Avail: NTIS HC $4.25 CSCL 03B

A plug-in-and-grind formalism is derived for calculating the gravitational waves emitted by any system with weak internal gravitational fields. If the internal fields have negligible influence on the system's motions, then the formalism reduces to standard linearized theory. Whether or not gravity affects the motions, if the motions are slow and internal stresses are weak, then the new formalism reduces to the standard quadrupole-moment formalism. In the general case the new formalism expresses the radiation in terms of a retarded Green's function for slightly curved spacetime, and then breaks the Green's-function integral into five easily understood pieces: direct radiation, produced directly by the motions of the sources; whump radiation, produced by the the gravitational stresses of the source; transition radiation, produced by a time-changing time delay (Shapiro effect) in the propagation of the nonradiative, $1/r$ field of the source; focussing radiation produced when one portion of the source focusses, in a time-dependent way, the nonradiative field of another portion of the source, and tail radiation, produced by backscatter of the nonradiative field in regions of focussing. Author

N75-12873*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
FEATURES OF POLAR CUSP ELECTRON PRECIPITATION ASSOCIATED WITH A LARGE MAGNETIC STORM
F. W. Berko Nov. 1974 25 p refs Submitted for publication
(NASA-TM-X-70792; X-626-74-326) Avail: NTIS HC $3.25 CSCL 03B

Measurements of precipitating electrons made by the OGO-4 satellite reveal several interesting phenomena in the polar cusp. Extremely high fluxes of 0.7 keV electrons were observed in the polar cusp ninety minutes following the sudden commencement of a very large magnetic storm. Structured, fairly high fluxes of 7.3 keV electrons were also observed in the cusp region, accompanied by very strong search coil magnetometer fluctuations, indicative of strong field-aligned currents. The observations confirm previously reported latitudinal shifts in the location of the polar cusp in response to southward interplanetary magnetic fields. Author

N75-12874*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
MICROSCALE ALFVEN WAVES IN THE SOLAR WIND AT 1 AU
L. F. Burlaga and J. M. Turner Nov. 1974 20 p refs Submitted for publication
(NASA-TM-X-70793; X-692-74-329) Avail: NTIS HC $3.25 CSCL 03B

Analysis of IMP 1 (Explorer 43) plasma and magnetic field fluctuations on a scale of one hour revealed that linearly and circularly polarized Alfven waves are rarely present in the solar wind at 1 AU. The most prevalent microscale fluctuations appeared to be large-amplitude Alfven waves with small but non-zero fluctuations in the magnetic field intensity. These waves are present about 40% of the time and are predominantly propagating away from the sun. Author

N75-12875*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
RESULTS OF INDUCED ATMOSPHERE MEASUREMENTS FROM THE APOLLO PROGRAM
Robert J. Naumann Washington Dec. 1974 53 p refs
(NASA-TN-D-7854; M-464) Avail: NTIS HC $4.25 CSCL 03B

Experiments on Apollo missions 15, 16, and 17 were utilized in an attempt to learn about the induced environment in the vicinity of manned spacecraft. Photographic sequences were examined to obtain scattered light data from the spacecraft-generated particulates during quiescence periods and after liquid dumps. The results allowed estimates of the obscuration factor and the clearing times after dumps. It was found that the clearing times were substantially longer than anticipated. The mass spectrometer detected a high molecular flux in lunar orbit which was induced by the spacecraft. It is shown that this is most likely caused by small ice crystals being continually produced in lunar orbit. Other data from the ultraviolet spectrometer and the stellar camera are also analyzed, and estimated values or upper limits are placed on the total scattering background, the size and number of particles generated, the velocity range, and the column density. Author

N75-12876# Los Alamos Scientific Lab., N.Mex.
TITIUS-BODE LAW AND THE POSSIBILITY OF RECENT LARGE SCALE EVOLUTION IN THE SOLAR SYSTEM
M. M. Nieto 1973 10 p refs Presented at Symp. on Velikovsky and the Recent History of the Solar Sys., Hamilton, Canada, 16 Jun. 1974
(Contract W-7405-eng-36)
(LA-UR-74-919; Conf-740643-1) Avail: NTIS HC $3.25

The Titius-Bode Law of Planetary Distances is discussed in light of the possibility of recent large scale evolution in the solar system. It is concluded that one denies the other.
Author (NSA)

N75-12877# Los Alamos Scientific Lab., N.Mex.
UNIFIED MODEL OF SOLAR SYSTEM AND GALAXY FORMATION BASED ON EXPLOSIVE FRAGMENTATION
W. K. Brown Apr. 1974 18 p refs
(Contract W-7405-eng-36)
(LA-5364) Avail: NTIS HC $3.25

A cosmogonical model based on postulated fragmentation during postexplosion expansion is proposed. Application to both solar system and galaxy formation produces descriptions of systems closely resembling those presently observed.
Author (NSA)

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights.

For spacecraft design see *18 Spacecraft Design Testing, and Performance*. For space stations see *15 Launch Vehicles and Space Vehicles*.

N75-12878*# Sandia Labs., Albuquerque, N.Mex.
MARS PENETRATOR: SUBSURFACE SCIENCE MISSION
Charles K. Lumpkin Aug. 1974 208 p refs
(NASA Order RA-88365-A; Contract AT(29-1)-789)
(NASA-CR-137587; SAND-74-0130) Avail: NTIS HC $7.25 CSCL 03B

A penetrator system to emplace subsurface science on the planet Mars is described. The need for subsurface science is discussed, and the technologies for achieving successful atmospheric entry, Mars penetration, and data retrieval are presented.
Author

N75-12879# TRW Systems Group, Redondo Beach, Calif.
PIONEER JUPITER/SATURN PRESS REFERENCE
[1974] 78 p refs
Avail: NTIS HC $4.75

The flight of the Pioneer Jupiter/Saturn spacecraft is reported. The planet Jupiter is discribed in terms of the findings of Pioneer 10, and the planet Saturn is also described. The Pioneer Plaque, onboard instruments, and experiments are discussed. A brief history of the Pioneer Project is presented.
F.O.S.

N75-12880*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
RADIATIVE PROPERTY DATA FOR VENUSIAN ENTRY: A COMPENDIUM
Jim J. Jones, Robert Boughner, E. Kenneth V. Haggard, John E. Nealy, David R. Schryer, and Ernest V. Zoby Washington 1974 85 p refs
(NASA-SP-348; LC-74-600096) Avail: NTIS HC $4.75 CSCL 03B

A compilation of experimental and calculated data on the radiative properties of species important in Venusian entry is presented. Molecular band systems, atomic lines, free-bound continua, and free-free continua are considered for the principal radiating species of shock-heated carbon dioxide. Data pertinent to the species in the ablation layer are included. The Venus atmosphere so closely approximates pure carbon dioxide (CO_2) that the inviscid layer radiation is due almost entirely to thermally excited CO_2. Data are included on the violet band system of the cyanogen radical CN. Recommendations are made as to best property values for radiative heating calculations. A review of the basic equations and the relationships of the various emission-absorption gas properties is included.
Author

N75-12881# Oak Ridge National Lab., Tenn.
SOME SURFACE PROPERTIES OF APOLLO 17 SOILS
H. F. Holmes, E. L. Fuller, Jr., and R. B. Gammage 1974 23 p refs Presented at the 5th Lunar Sci. Conf., Houston, Tex., 18 Mar. 1974 Sponsored by AEC
(Conf-740321-3) Avail: NTIS HC $3.25

The surface chemistry of Apollo 17 lunar fines samples 74220 (the orange soil) and 74241 (the gray control soil) was studied by measuring the adsorption of nitrogen, argon, and oxygen (all at 77 K) and also water vapor (at 20 or 22 C). In agreement with results for samples from other missions, both samples had low initial specific surface areas, consisted of nonporous particles, and were attacked by water vapor at high relative pressures to give an increased specific surface area and create a pore system which gave rise to a capillary condensation hysteresis loop in the adsorption isotherms. In contrast to previous samples, both of the Apollo 17 soils were partially hydrophobic in their initial interaction with water vapor (both samples were completely hydrophilic after the reaction with water). The results are consistent with formation at high temperatures without subsequent exposure to significant amounts of water.
Author (NSA)

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N75-12882*# Stanford Univ., Calif. Inst. for Plasma Research.
THE RELATIONSHIP BETWEEN SOLAR FLARES AND SOLAR SECTOR BOUNDARIES
Phil H. Dittmer Oct. 1974 11 p refs Submitted for publication
(Grant NGR-05-020-559; Contract N00014-67-A-0112-0068; Grant NSF GA-31138)
(NASA-CR-140856; SU-IPR-597) Avail: NTIS HC $3.25 CSCL 03B

A superposed epoch analysis of 1964-1970 solar flares shows a marked increase in flare occurrence within a day of (-+) solar sector boundaries, as well as a local minimum in flare occurrence near (+-) sector boundaries. This perference for (-+) boundaries is more noticeable for Northern Hemisphere flares, where these polarities match the Hale polarity law, but is not reversed in the south. Plage regions do not show such a perference. Author

N75-12883*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
ESTIMATES OF RADIATION EXPOSURE FROM SOLAR COSMIC RAYS IN SST ALTITUDES
Trutz Foelsche Nov. 1974 14 p refs Presented at the FAUSST 6 Meeting, London, Feb. 1968
(NASA-TM-X-71990) Avail: NTIS HC $3.25 CSCL 03B

Factors influencing crew and passenger exposure to solar and galactic cosmic rays that is expected to occur during flights of supersonic transport aircraft are discussed, and some possibilities are considered for decreasing such exposure.
Author

N75-12884*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
DIRECTIONAL DISCONTINUITIES FROM MARINER 5 AND SOLAR WIND STRUCTURE
J. M. Turner Aug. 1974 36 p refs
(NASA-TM-X-70733; X-693-74-234) Avail: NTIS HC $3.75 CSCL 03B

Directional discontinuities from Mariner 5 are studied. A substantial majority of the events have properties which are consistent with their being identified as tangential discontinuities. The results presented here agree in several respects with those of Burlaga from Pioneer 6. In addition, new results are presented. Previous Mariner 5 work on this subject is summarized with an explanation of apparent inconsistencies.
Author

N75-12885*# National Aeronautics and Space Administration, Washington, D.C.
OUR PRODIGAL SUN
1974 16 p
(NASA-EP-118) Avail: NTIS MF $2.25; SOD HC $0.35 CSCL 03B

Characteristics of the sun are reported indicating it as a source of energy. Data from several space missions are discussed, and the solar activity cycle is presented. The corona, flares,

prominences, spots, and wind of the sun are also discussed.
M.C.F.

N75-12886# Oak Ridge National Lab., Tenn.
CALCULATING THE DAILY VARIATIONS OF SOLAR ENERGY INCIDENT ON FLAT PLATES
R. W. Derby May 1974 29 p refs
(Contract W-7405-eng-26)
(ORNL-TM-4564) Avail: NTIS HC $3.75

A procedure for calculating the solar energy incident on flat plates of different orientations is given in detail. The use of latitude, declination, and time to find the azimuth and zenith angle of the sun is explained. A convenient and quantitative description of how the attenuation of the sun's rays varies with zenith angle is described. The results of sample calculations for latitude 32 deg N at the time of the solstices and equinoxes are presented. Finally, reference data and a listing of a short computer program are included. Author (NSA)

93 SPACE RADIATION

Includes cosmic radiation and inner and outer earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

N75-12887*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
INTERSTELLAR SCATTERING OF PULSAR RADIATION. 1: SCINTILLATION
D. C. Backer Nov. 1974 31 p refs Submitted for publication
(NASA-TM-X-70789; X-693-74-316) Avail: NTIS HC $3.75 CSCL 03B

An investigation of the intensity fluctuations of 28 pulsars near 0.4 GHz indicates that scintillation spectra have a Gaussian shape, scintillation indices are near unity, and the scintillation bandwidth depends linearly on dispersion measure. Observations near 2.5 GHz suggest a strong dependence of the frequency at which scintillation indices fall below unity on dispersion measure. Multistation measurements of scintillation provide values or limits for the scale size of the scattering diffraction pattern. The dependences of scattering parameters on dispersion measure is discussed in terms of the current models. It is suggested that any line of sight through the galaxy encounters increasingly rare, increasingly large deviations of thermal electron density on the scale of 10 to the 11th power cm. Author

N75-12888# Los Alamos Scientific Lab., N.Mex.
COSMIC GAMMA-RAY BURSTS: A REVIEW OF THE OBSERVATIONAL DATA
I. B. Strong 1974 38 p refs Presented at the ESLAB Symp. on the Context and Status of Gamma-Ray Astronomy, Frascati, Italy, 10 Jun. 1974 Sponsored by AEC
(LA-UR-74-833; Conf-740628-2) Avail: NTIS HC $3.75

A general introduction to the session on transient cosmic X- and gamma-ray sources-gamma bursts is presented. Temporal properties are discussed, including duration, fluctuation, and frequencies. Energy fluxes and spectral properties are described. The directional data is used to provide estimates of the distance to the sources and the absolute luminosities involved.
Author (NSA)

99 GENERAL

N75-12889# Research Inst. of National Defence, Stockholm (Sweden).
REVIEW OF AN AMPLIFIER TUBE FOR PICTURES AT LOW LIGHT LEVELS [OEVERSIKT OEVER BILDFOERSTAERKARROER FOER LAGA LJUSNIVAER]
Olle Andersson Jan. 1973 28 p In SWEDISH
(FOA-2-C-2585-E1-E3) Avail: NTIS HC $3.75

The first part of the report gives a general description of the fundamental principles of the electronic photoamplifier and of the present stage of development. It also surveys those light levels and spectral divisions of light rays that can be expected at night time. In the last part of the report a quantitative treatment of the photoamplifier system is carried out in which the composition of night radiation, the efficiency of the cathode, the objective diameter and the transfer function for the system, are all taken into account. Author

N75-12890# Research Inst. of National Defence, Stockholm (Sweden).
LYSTER: AIR DEFENCE SURFACE PROTECTION CAPABILITY IN SWEDISH TERRAIN [LYSTER: LUFTVAERNETS YTTAECKNINGSFOERMAGA I SVENSK TERRAENG]
Bjoern Eriksson and Erland Tarras-Wahlberg Jan. 1973 92 p In SWEDISH
(FOA-P-C-8349-M1) Avail: NTIS HC $4.75

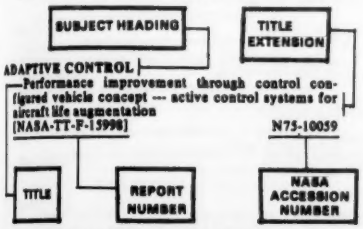
LYSTER is a stochastic computer model for calculating the effectiveness of the air defense unit against hostile air units. The model is specially adapted for studying the results against low flying attack aircraft. The following influencing factors are therefore considered with special care: The terrain, antiaircraft gun units, technical obligations and tactics, the aircraft units, technical obligations and tactics, optical aiming, electronic and other countermeasures. Author

N75-12891# Army Armament Command, Rock Island, Ill. Systems Analysis Office.
ANALYSIS OF DELIVERY ACCURACY FOR AH-1G (COBRA) LAUNCHED 2.75-INCH ROCKETS FROM TESTS CONDUCTED JANUARY - MARCH 1972 AT CHINA LAKE, CALIFORNIA Technical Report, Jun. - Aug. 1973
Walter J. Baumen, Jr. May 1974 30 p refs
(AD-782978; SAO-3) Avail: NTIS CSCL 05/9

The accuracy of the AH-1G (COBRA)/2.75 inch rocket system was determined. Results are -9.4 mils in pitch, 9.3 mils in deflections for pass-to-pass variable bias. The values 9.1 mils(at 3000 meters) to 20.6 mils (at 1300 meters) in pitch, and 9.9 mils in deflection apply to ripple-to-ripple variable bias. For round-to-round error, the values 7.6 to 10.0 mils in pitch and 8.7 to 11.3 mils in deflection are given. These values are given for the attack slant ranges between 1300 and 3000 meters. They are for experienced pilots. The effect of experience on accuracy of pilots is given for this rocket system. Author (GRA)

SUBJECT INDEX

TYPICAL SUBJECT INDEX LISTING



The subject heading is the key to the subject content of the document. Titles, report numbers, and accession numbers of pertinent documents are provided under each subject heading. When the title is insufficiently descriptive of the document content, a title extension has been added, separated from the title by three hyphens. The report number helps to indicate the type of document cited (e.g., NASA report, NASA translation, NASA contractor report). The NASA accession number is the number by which the document abstracts are arranged in this journal and by which the document is sold or requested. The titles, with title extensions if present, are arranged under each subject heading in ascending accession number order. The subject headings have been selected from the latest revision of the *NASA Thesaurus* (NASA SP-7040).

A

ABLATIVE MATERIALS
An arc imaging furnace for the characterization of thermally protective materials
[AD-785586] N75-12055

ABSORPTION
Far infrared absorption in small metallic particles
[COO-3151-38] N75-12708

ABSORPTIVITY
Absorption studies with pentanes for labeling pore structure and material transport in porous silica
N75-12145

ACCELERATION STRESSES (PHYSIOLOGY)
The control of the cardiovascular and central nervous system --- under acceleration stress
[AD-784933] N75-12582

ACCELERATORS
Annular arc accelerator shock tube
[NASA-CASE-NPO-13528-1] N75-11997

ACCURACY
Analysis of delivery accuracy for AH-1G [Cobra] launched 2.75-inch rockets from tests conducted January - March 1972 at China Lake, California
[AD-782978] N75-12891

ACOUSTIC ATTENUATION
Noise of jets which are impinging on obstacles [for examples externally blown flaps] and possibilities of noise attenuation
N75-11951

Acoustic attenuation design requirements established through EPNL parametric trades
[NASA-CR-120986] N75-11985

ACOUSTIC FATIGUE
Thermal and acoustic fatigue of ceramics and their evaluation
[AD-785547] N75-12152

ACOUSTIC IMPEDANCE
Effect of nonsymmetrical flow resistance upon orifice impedance resistance
[NASA-TM-X-72624] N75-12233

ACOUSTIC MEASUREMENTS
Measurement and analysis of aircraft far-field aerodynamic noise
[NASA-CR-2377] N75-11982

ACOUSTIC PROPAGATION
Proceedings of the Canadian Workshop on acoustic surface waves
[CRC-1260] N75-12696

Introduction to the proceedings of the Canadian workshop on acoustic surface waves
N75-12697

Interdigital transducers and acoustic-surface-wave filters
N75-12698

Fabrication technology and materials --- for surface acoustic wave devices
N75-12699

Systems applications and implementation 1: Communications --- employing surface acoustic wave devices
N75-12700

Systems applications and implementation 2: Radar --- employing surface acoustic wave devices
N75-12701

Optical probing of surface waves
N75-12703

ACOUSTIC PROPERTIES
Measurement and analysis of aircraft far-field aerodynamic noise
[NASA-CR-2377] N75-11982

Development of an improved design tool for predicting and simulating helicopter rotor noise
[AD-785579] N75-11993

ACOUSTICAL HOLOGRAPHY
The effect of stochastic interferences on the acoustic holographic imagery of objects
N75-12284

ACOUSTICS
Some results of aeroacoustic research --- effect of shrouded nozzle configurations on jet noise
N75-11950

Surface acoustic wave notch filter using a phase-shifting technique
[AD-785569] N75-12214

ACOUSTO-OPTICS
The effect of stochastic interferences on the acoustic holographic imagery of objects
N75-12284

ACRYLIC RESINS
Development of an improved technique for forming acrylic spheres --- application to underwater habitation and exploration
[AD-784113] N75-12337

Thin film research and development --- antireflectance coatings for acrylic plastics
[AD-779389] N75-12339

ACRYLONITRILES
A three-dimensional structure model for a high modulus pan-based carbon fiber
[AD-784415] N75-12085

ACTINIDE SERIES COMPOUNDS
Electronic structure and bonding of actinide complexes --- using Hartree approximation
[COO-3077-53] N75-12816

ACTIVITY (BIOLOGY)
A system of computer programs for recording the activity of mice
[FOA-1-C-1478-M4] N75-12545

ACTUATORS
Study of the axial actuator --- magnetic bearing axial and radial stiffness
N75-12053

ADAPTIVE CONTROL
Description of some experimental methods with adaptive planning
[FOA-P-C-8339-M3] N75-12853

ADDING CIRCUITS
Possibilities for the construction of various types of multi-value adders from mixers, switches, and spectrotrons
[AD-781323/1] N75-12626

ADDITIVES
X-ray topographic study of crystal defects produced by diffusion of additive elements in single germanium crystals
N75-12089

ADRENAL METABOLISM
Morphocytochemical reaction of the suprarenals and thymic-lymphatic system of rats after termination of hypokinesia
N75-12556

Time dependence of the flight induced increase of free urinary cortisol secretion in jet pilots
N75-12597

AERIAL EXPLOSIONS
The tolerance of birds to airblast
[AD-785259] N75-12550

AERIAL PHOTOGRAPHY
Correlation of missions 191, 51M and helicopter photography --- aerial photography and mapping of three areas in Test Site 175 in Texas
[NASA-CR-134289] N75-12279

Image selection system --- computerized data storage and retrieval system
[NASA-CR-2475] N75-12422

AERIAL RECONNAISSANCE
Analysis of unmanned, tethered, rotary-wind platforms
[AD-785581] N75-11903

Correlation of missions 191, 51M and helicopter photography --- aerial photography and mapping of three areas in Test Site 175 in Texas
[NASA-CR-134289] N75-12279

Sample test reports for camera, still picture, KA-91B --- performance tests of camera for aerial reconnaissance
[AD-785399] N75-12294

AERODYNAMIC CHARACTERISTICS
Application of the nonlinear theory of a lifting surface to the calculation of aerodynamic characteristics of a triangular wing moving close to the earth's surface
[AD-785134] N75-11901

Reentry aerodynamic characteristics of a space shuttle solid rocket booster model 449 tested in MSFC 14 by 14 inch TWT [SA26F]
[NASA-CR-134435] N75-12022

Aerodynamic results of wind tunnel separation tests on a 0.01-scale model [32-OTS] space shuttle integrated vehicle in the AEDC-VKF-SWTA [IA57]
[NASA-CR-134401] N75-12029

Effects of wing/elevon gap sealing flapper doors on orbiter elevon effectiveness of model 16-0 in the NAAL 7.75 by 11 foot continuous flow wind tunnel [OA119A]
[NASA-CR-134421] N75-12035

The Mark 4 supersonic-hypersonic arbitrary body program. Volume 1: User's manual
[AD-778443] N75-12056

The Mark 4 supersonic-hypersonic arbitrary body program. Volume 3: Program listings
[AD-778445] N75-12057

AERODYNAMIC COEFFICIENTS
Effects of leading edge sweep angle and design lift coefficient on performance of a modified arrow wing at a design Mach number of 2.6
[NASA-TN-D-7753] N75-11893

Nonlinear theory of a carrying surface in a noncompressible flow
[AD-785113] N75-12266

AERODYNAMIC CONFIGURATIONS
Interactive computer-aided design aircraft flying qualities program. Volume 1: Users manual
[AD-785101] N75-11957

Interactive computer-aided design aircraft flying qualities program. Volume 2: Methods formulation manual
[AD-785102] N75-11958

Interactive computer-aided design aircraft flying qualities program. Volume 3: Computer programming manual
[AD-785103] N75-11959

Results of investigations on an 0.015-scale 140A/B configuration of the Rockwell International space shuttle orbiter [model 49-O] in the NASA/Ames Research Center 3.5-foot hypersonic wind tunnel [OA36]
[NASA-CR-134430] N75-12031

AERODYNAMIC DRAG
Transonic and supersonic wind tunnel test of the action hypervelocity test missile. Volume 2: Drag characteristics
[AD-785566] N75-11905

AERODYNAMIC FORCES
For STOL capability
N75-11943

A hypersonic force and moment test of a 0.006 scale model [466] of the 330.2 inch diameter external tank in the Ames Research Center 3.5 foot hypersonic wind tunnel [TA9F] --- space shuttle development
[NASA-CR-134425] N75-12032

AERODYNAMIC HEATING
Investigation of convective arcs for the simulation of reentry aerodynamic heating
[AD-785388] N75-12021

AERODYNAMIC NOISE
Development of an improved design tool for predicting and simulating helicopter rotor noise
[AD-785579] N75-11993

AERODYNAMIC STABILITY
Transonic and supersonic wind tunnel test of the action hypervelocity test missile. Volume 1: Stability characteristics
[AD-785565] N75-11904
AERODYNAMICS
Problem of analytical solution of equations of dynamics for the model of an equivalent barotropic level of the atmosphere
[AD-785106] N75-12533
AEROLOGY
General physical characteristics of mists
[MONO-92] N75-12483
AERONAUTICS
Bibliography of bibliographies in the DDC collection
[AD-780700/1] N75-12851
AEROSOLS
Quantitative determination of stratospheric aerosol characteristics
[E75-10010] N75-12393
A study of literature on methods to determine the effect on visibility of the atmospheric particle concentration, size and distribution --- recording and collection of aerosols
[FOA-2-C-2606-E1] N75-12471
Balloon-borne aerosol counter modifications, particle sizing accuracy tests
[AD-784866] N75-12475
Boundary layer aerosol transport measurements in a valley system
[AD-781010/4] N75-12477
Aerostatic measurements of the vertical distribution of the atmospheric aerosol
[AD-785114] N75-12479
Complex studies of the stratospheric aerosol --- optical properties of aerosols and effects on stratospheric radiation
N75-12509
AEROSPACE ENGINEERING
AGARD index of publications, 1952 - 1970. Part 3: Author index. Part 4: Addendum to Part 1
[AGARD-INDEX-52/70] N75-12847
AEROSPACE MEDICINE
Space biology and aerospace medicine, volume 8, no. 5, 1974
[JPRS-63603] N75-12552
AEROSPACE SCIENCES
Soviet bloc research in geophysics, astronomy, and space, no. 337
[JPRS-63543] N75-12384
Soviet bloc research in geophysics, astronomy, and space, no. 336
[JPRS-63427] N75-12385
AFFERENT NERVOUS SYSTEMS
Neurophysiological aspects of interaction of the vestibular system with other body sensory systems
N75-12553
AGING [BIOLOGY]
Recovery time after being dazzled, as a function of age --- eye adaptation in photostress
[FOA-2-C-2587-E1] N75-12576
AGRICULTURE
Feasibility study ASCS remote sensing/compliance determination system
[NASA-CR-134288] N75-12419
The value of improved [ERS] information based on domestic distribution effects of U.S. agriculture crops
[NASA-CR-141046] N75-12423
Evapotranspiration: Agrometeorological aspect and evaluation of potential evapotranspiration
[MONO-65] N75-12482
Meteorology and hydrology, no. 8, 1974 --- climatology, agriculture meteorology, weather forecasting, and hydrology
[JPRS-63560] N75-12488
Automated remote measuring system in agrometeorology
N75-12518
Weather forecast and forecast of the agrometeorological conditions for the Fall of 1974 [26 August to 15 October]
N75-12527
AIR BREATHING ENGINES
Effects of air breathing engine plumes on SSV orbiter subsonic wing pressure distribution [OA57B], volume I
[NASA-CR-134416] N75-12034
AIR CURRENTS
Ground effect devices for transport of personnel and goods over short distances using air suspension
[FOA-2-A-2566-F8[F3]] N75-11897
AIR DEFENSE
The air defence role --- pilot training in complex tasks
N75-12602
LYSTER: Air defence surface protection capability in Swedish terrain
[FOA-P-C-8349-M1] N75-12890
AIR FILTERS
Methods of cleaning and servicing air supplies, and their control
[FOA-1-A-1561-H3] N75-12453
AIR NAVIGATION
Modified post-flight processor for CIRIS
[AD-785370] N75-11916
Proceedings of Quarterly Meeting of Life Cycle Cost Task Group of the Joint Services Data Exchange for Inertial Systems
[AD-785391] N75-11918
AIR POLLUTION
Formation of mixed molecular clusters in free-jet expansions --- air pollution from jet engine exhaust gases
[AD-785347] N75-12112
Methods for analysis of nitrogen monoxide and nitrogen dioxide in the atmosphere and in exhaust gases. A literature search
[FOA-1-C-1469-H3] N75-12454
Experiments with a catalytic cleaner for car engine exhaust gases
[FOA-1-C-1492-H3] N75-12455
Dispersion simulation techniques for assessing the air pollution impacts of ground transportation systems
[ANL/ES-29] N75-12458
Airborne vapor surveillance system
[AD-785585] N75-12459
A study of literature on methods to determine the effect on visibility of the atmospheric particle concentration, size and distribution --- recording and collection of aerosols
[FOA-2-C-2606-E1] N75-12471
General physical characteristics of mists
[MONO-92] N75-12483
Turbulent diffusion in the environment
N75-12506
Rate of formation and dissipation of smog in open industrial quarries
N75-12515
AIR PURIFICATION
Methods of cleaning and servicing air supplies, and their control
[FOA-1-A-1561-H3] N75-12453
AIR QUALITY
Automobile emission standards
[S-REPT-93-598] N75-12452
In the interests of clean air --- in Kiev, Ukraine
[AD-785206] N75-12460
AIR SAMPLING
Dispersion simulation techniques for assessing the air pollution impacts of ground transportation systems
[ANL/ES-29] N75-12458
AIR TO AIR MISSILES
Modular digital missile guidance system study
[AD-784969] N75-12054
AIR TO AIR REFUELING
Long range air-to-air refuelling: A study of duty and sleep patterns
N75-12600
AIR TRAFFIC CONTROL
The TAM-TAM system --- development of air-ground-air data transmission link for air traffic control
[RAE-LIB-TRANS-1756] N75-11913
An advanced air traffic management concept based on extension of the upgraded third generation ATC system. System B: Airport capacity analysis
[AD-785334] N75-11917
An advanced air traffic management concept based on extensions of the upgraded third generation ATC system
[AD-785023] N75-11919
Synchronization station location study: Tradeoff phase
[AD-785335] N75-11921
An advanced air traffic management concept based on extensions of the upgraded third generation ATC system. System B: ATC automation analysis
[AD-785312] N75-11923
An advanced air traffic management concept based on extensions of the upgraded third generation ATC system. System B: System cost analysis
[AD-785313] N75-11924
An advanced air traffic management concept based on extensions of the upgraded third generation ATC system. System B: Discrete Address Beacon System [DABS] accuracy and coverage requirements
[AD-785311] N75-11925
An advanced air traffic management concept based on extensions of the upgraded third generation ATC system. System B: 1995 Los Angeles Basin traffic model, volume 1
[AD-785309] N75-11926
An advanced air traffic management concept based on extensions of the upgraded third generation ATC system. System B: 1995 Los Angeles Basin traffic model, volume 2
[AD-785310] N75-11927
An advanced air traffic management concept based on extensions of the upgraded third generation ATC system. System B: Air traffic activity projections for 1995
[AD-785308] N75-11928
New or newly tested methods for the assessment of pilots' workload --- conference
[DLR-MITT-74-19] N75-12605
AIR TRANSPORTATION
Man as a precious resource: The enhancement of human effectiveness in air transport operations
[AD-785368] N75-12620
AIR WATER INTERACTIONS
The nonlinear growth of hurricanes through CISK
[AD-782662/1] N75-12535
Marine physics: Internal-surface wave interaction
[AD-785262] N75-12540
AIRBORNE EQUIPMENT
Airborne vapor surveillance system
[AD-785585] N75-12459
AIRBORNE/SPACEBORNE COMPUTERS
Reliability history of the Apollo guidance computer
[NASA-CR-140340] N75-12345
Input-output interfaces for the D17B bus-structured I/O system
[AD-785128] N75-12627
Department of defense space shuttle on-board software requirements
[AD-785123] N75-12648
AIRCRAFT
Electric tow truck for planes described
N75-12835
AIRCRAFT ACCIDENTS
Aircraft accident medical investigator's kit
[AD-785389] N75-12583
AIRCRAFT BRAKES
Development and applications of the air cushion landing system --- to reduce ground pressure in conditions of poor soil strength
N75-11952
AIRCRAFT CARRIERS
An advanced air traffic management concept based on extensions of the upgraded third generation ATC system. System B: Air traffic activity projections for 1995
[AD-785308] N75-11928
AIRCRAFT COMMUNICATION
Airborne Visible Laser Optical Communications [AVLOC] experiment
[NASA-TM-X-64894] N75-12296
AIRCRAFT CONFIGURATIONS
Investigations into aircraft noise reduction by shielding --- europlane QTOL design concept
N75-11949
AIRCRAFT CONTROL
Aspects of guidance and control for steep and curved approaches of STOL aircraft
N75-11945
Control authority with a flight performance controller --- development of aircraft system for pilot control of aircraft bank angle and vertical speed
[AD-784889] N75-11953
AIRCRAFT DESIGN
Technical problems encountered in the study of a dirigible freighter
[CEA-CONF-2580] N75-11899
Numerical methods for the design and analysis of wings at supersonic speeds
[NASA-TN-D-7713] N75-11930
Europlane QTOL: Design parameter tradeoffs
N75-11942
Air cushion landing systems for aircraft --- short takeoff aircraft
N75-11944
Interactive computer-aided design aircraft flying qualities program. Volume 1: Users manual
[AD-785101] N75-11957
Interactive computer-aided design aircraft flying qualities program. Volume 2: Methods formulation manual
[AD-785102] N75-11958
Interactive computer-aided design aircraft flying qualities program. Volume 3: Computer programming manual
[AD-785103] N75-11959
Interactive computer-aided design aircraft flying qualities program. Volume 4: Program assessment/correlation report
[AD-785104] N75-11960
AIRCRAFT ENGINES
Fundamental and applied research on core engine/combustion noise of aircraft engines
[NASA-CR-140860] N75-11974
Fighter aircraft engine dependability versus reconnaissance aircraft engine dependability when both aircraft use the same engine
[AD-785444] N75-11995
AIRCRAFT EQUIPMENT
Depot requirements for base level data on aircraft inertial platforms
[AD-785443] N75-11914
Control authority with a flight performance controller --- development of aircraft system for pilot control of aircraft bank angle and vertical speed
[AD-784889] N75-11953
Design and mockup evaluation of a high-strength armored crew seat for transport/cargo aircraft
[AD-785145] N75-11956
An emergency life saving instant exit system for cargo, cargo-transport and passenger aircraft, volume 2
[AD-778824] N75-11966

Cleaning and corrosion control of avionics equipment at all levels of maintenance
[AD-784975] N75-11968
Analysis of delivery accuracy for AH-1G [Cobra] launched 2.75-inch rockets from tests conducted January - March 1972 at China Lake, California
[AD-782978] N75-12891

AIRCRAFT GUIDANCE
Aspects of guidance and control for steep and curved approaches of STOL aircraft
N75-11945

AIRCRAFT INSTRUMENTS
Oxygen concentration sensor for aircraft fuel tanks
[AD-785144] N75-11967

AIRCRAFT LANDING
Air cushion landing systems for aircraft --- short takeoff aircraft
N75-11944
Development and applications of the air cushion landing system --- to reduce ground pressure in conditions of poor soil strength
N75-11952
Engineering flight test, AH-1G helicopter, heavyweight autorotational evaluation
[AD-785553] N75-11964
Pilot landing performance under high workload conditions --- considering day and night proficiencies
N75-12594
Prediction of pilot performance: Biochemical and sleep-mood correlates under high workload conditions --- during aircraft carrier landings
N75-12599
Investigation of pilot's role and display requirements in automatic landings
[NASA-CR-140844] N75-12617

AIRCRAFT MAINTENANCE
Major Item Special Study [MISS], CH-54A rotary wing blade
[AD-785554] N75-11906
Cleaning and corrosion control of avionics equipment at all levels of maintenance
[AD-784975] N75-11968

AIRCRAFT MODELS
Deploy/release system --- model aircraft flight control
[NASA-CASE-LAR-11575-1] N75-12195

AIRCRAFT NOISE
Parametric study of STOL short-haul engine cycles and operational techniques to minimize community noise impact
[NASA-CR-2486] N75-11910
Atmospheric attenuation of aircraft noise. Experimental valves measured in a range of climatic conditions, volume 1
[HSA-HAD-R-GEN-214-VOL-1] N75-11979
Atmospheric attenuation of aircraft noise. Experimental valves measured in a range of climatic conditions, volume 2
[HSA-HAD-R-GEN-214-VOL-2] N75-11980
Measurement and analysis of aircraft far-field aerodynamic noise
[NASA-CR-2377] N75-11982
Community noise exposure resulting from aircraft operations: Computer program operation's manual
[AD-785360] N75-11989
Development of an improved design tool for predicting and simulating helicopter rotor noise
[AD-785579] N75-11993

AIRCRAFT PERFORMANCE
A motion-constraint logic for moving-base simulators based on variable filter parameters
[NASA-TN-D-7777] N75-11933
Short course on STOL aircraft technology and the community, volume 1
N75-11938
STOL aircraft design approaches: Noise considerations and performance tradeoffs --- lift devices
N75-11940
Short course on STOL aircraft technology and the community, volume 2
N75-11946

AIRCRAFT PILOTS
Time dependence of the flight induced increase of free urinary cortisol secretion in jet pilots
N75-12597
Emotional and biochemical effects of high workload --- in pilot landing performance
N75-12598

AIRCRAFT STABILITY
Interactive computer-aided design aircraft flying qualities program. Volume 4: Program assessment/correlation report
[AD-785104] N75-11960

AIRCRAFT STRUCTURES
Program for establishing long-time flight service performance of composite materials in the center wing structure of C-130 aircraft. Phase 3: Fabrication
[NASA-CR-132495] N75-11937

AIRCRAFT TIRES
Friction and temperature rise in aircraft tires
[NASA-CR-134666] N75-11929

AIRCRAFT WAKES
A wind tunnel investigation of the wake near the trailing edge of a deflected externally blown flap --- on a jet powered STOL transport aircraft
[NASA-TM-X-3079] N75-11896

AIRFOILS
Two-dimensional subsonic evaluation of a 15-percent thick circulation control airfoil with slots at leading and trailing edges
[AD-785230] N75-11954
Second and third order difference techniques for two-dimensional hyperbolic systems of conservation laws, with an application to transonic flow about an airfoil
[UCRL-51529] N75-12251

AIRGLOW
Studies of the airglow, the aurora, the ion and neutral composition, and the chemistry of the terrestrial atmosphere
[NASA-CR-140960] N75-12473

AIRLINE OPERATIONS
The airline minimum fleet problem --- development of algorithms for optimization of airline operations
[AERO-TN-7403] N75-11909
An advanced air traffic management concept based on extensions of the upgraded third generation ATC system. System B: 1995 Los Angeles Basin traffic model, volume 1
[AD-785309] N75-11926
An advanced air traffic management concept based on extensions of the upgraded third generation ATC system. System B: 1995 Los Angeles Basin traffic model, volume 2
[AD-785310] N75-11927

AIRSHIPS
Technical problems encountered in the study of a dirigible freighter
[CEA-CONF-2580] N75-11899

ALDOSTERONE
Procedure for the isolation and determination of aldosterone in human urine by thin-film chromatography on polyamide and BTC micro-reaction
[RAE-LIB-TRANS-1778] N75-12579

ALGORITHMS
Some new algorithms for deterministic and probabilistic communication networks
[AD-785119] N75-12184
Third International Conference on Numerical Methods in Fluid Dynamics
[FOA-4-C-4518-A2] N75-12249
Sizing of complex structure by the integration of several different optimal design algorithms
[L-9738] N75-12361
Optimum response simulation of multidegree systems by pulse excitation --- by use of a computer algorithm
[AD-783226] N75-12382
New version of the program for operative objective analysis of the geopotential of isobaric surfaces
N75-12511
Scheduling language and algorithm development study. Appendix: Study approach and activity summary
[NASA-CR-140363] N75-12630
Natural science research application of methods of teaching a machine pattern recognition without a teacher
[JPRS-63501] N75-12632
Conversion of boundary-value problems into stable initial-value problems via several invariant imbedding algorithms
[SAND-74-5018] N75-12644
Prime implicant algorithm with factoring
[SLA-74-218] N75-12645
Algorithms for projection methods for solving linear systems of equations
[IS-3397] N75-12684
Boundary and object detection in real world images --- by means of algorithms
[NASA-CR-140828] N75-12734

ALKALI HALIDES
Investigation of a photodichroic material for holographic storage and recovery
[AD-785274] N75-12768

ALL-WEATHER AIR NAVIGATION
An advanced air traffic management concept based on extensions of the upgraded third generation ATC system. System B: Discrete Address Beacon System [DABS] accuracy and coverage requirements
[AD-785311] N75-11925

ALTERNATING CURRENT
AC electronic tunneling at optical frequencies
[NASA-CR-140802] N75-12812

ALUMINUM
Structure and mechanical properties of Cu-Mn-Al alloy
[LBL-2598] N75-12133

ALUMINUM ALLOYS
Combustion mechanism of particles of aluminum-magnesium alloys
[AD-785205] N75-12110
Observations on the stress corrosion cracking of an Al-5 percent Zn-2.5 percent Mg ternary and various quarternary alloys
[AD-785020] N75-12142
Superconducting properties of bulk and thin film Al5 compounds
[AD-785014] N75-12818

AMINES
Automated analysis of oxidative metabolites
[NASA-CASE-ARC-10469-1] N75-12086

AMMONIA
Infrared radiation from H2O, CO2 or NH3 collisionally excited by N2, O or Ar
[AD-785412] N75-12827

AMPLIFIERS
Nonlinear effects: Amplifiers and convolvers
N75-12702

ANALYTIC FUNCTIONS
A three parameter analytic phase function for multiple scattering calculations
[NASA-CR-140998] N75-12674

ANGLE OF ATTACK
Hypersonic flow around blunt body at angles of attack
[ISAS-515-VOL-39-12] N75-12246

ANGULAR ACCELERATION
Some regularities in adaptation to prolonged rotation --- improved human tolerance to weightlessness
N75-12562

ANGULAR RESOLUTION
Determination of the efficiency and angular directivity of cosmic gamma ray detectors
N75-12281

ANIMALS
Chamber for decompressing the caudal part of the animal body
N75-12568

ANNEALING
Annealing of stacking-fault tetrahedra and frank dislocation loops in silver
[LBL-1172] N75-12132

ANNUAL VARIATIONS
Phagocytic activity of human blood neutrophils under ordinary conditions of vital functioning and in an isolation chamber
N75-12571

ANTENNA ARRAYS
Instrument landing system improvement program: Environmental study of the 200 foot aperture slotted cable localizer antenna array
[AD-785025] N75-12009
An experimental study of coupling effects in a planar array antenna --- reflection factor calculation
[FOA-3-C-3728-E2] N75-12704

ANTENNA DESIGN
Antennas with controlled position of the directivity pattern in space [scanning antennas], chapter 2
N75-12202

ANTENNA RADIATION PATTERNS
Antennas with controlled position of the directivity pattern in space [scanning antennas], chapter 2
N75-12202

ANTENNAS
A low-sidelore antenna-radome study at Ka-band
[AD-785138] N75-12189
Analysis of strip antennas in the presence of a dielectric inhomogeneity
[NASA-CR-140854] N75-12201
Directivity of hydroacoustic antennas
[JPRS-63554] N75-12204

ANTHROPOMETRY
Application of human factors engineering data in medical evaluation of flight crews
N75-12611

ANTIMISSILE DEFENSE
Laser backscatter characteristics of materials of interest in Ballistic Missile Defense [BMD]
[AD-785393] N75-12323

ANTIREFLECTION COATINGS
Thin film research and development --- antireflectance coatings for acrylic plastics
[AD-779389] N75-12339

ANTISKID DEVICES
Skidproof dyes for concrete and asphalt
[FOA-2-C-2592-E6] N75-12333

APERTURES
Method of forming aperture plate for electron microscope
[NASA-CASE-ARC-10448-2] N75-12732

APOLLO PROJECT
Reliability history of the Apollo guidance computer
[NASA-CR-140340] N75-12345
Results of induced atmosphere measurements from the Apollo program --- possible effects of the induced environment in the vicinity of manned spacecraft on future manned laboratory experiments
[NASA-TN-D-7854] N75-12875

APOLLO 15 FLIGHT
Lunar particle shadows and boundary layer experiment: Plasma and energetic particles on the Apollo 15 and 16 subsatellites
[NASA-CR-140371] N75-12871

APOLLO 16 FLIGHT
Lunar particle shadows and boundary layer experiment: Plasma and energetic particles on the Apollo 15 and 16 subsatellites
[NASA-CR-140371] N75-12871

APOLLO 17 FLIGHT
Some surface properties of Apollo 17 soils
[CONF-740321-3] N75-12881

APPLICATIONS OF MATHEMATICS
Third International Conference on Numerical Methods in Fluid Dynamics
[FOA-4-C-4518-A2] N75-12249
APPROACH
Aspects of guidance and control for steep and curved approaches of STOL aircraft
N75-11945
APPROXIMATION
Atmospheric moisture parameterization --- spatial distribution of atmospheric moisture
[AD-784814] N75-12476
REBAL computer program series for linear propagation of uncertainty
[ANCR-1153] N75-12641
ARC DISCHARGES
Energy distributions of ions from a pulsed vacuum arc
[SLA-74-5034] N75-12795
ARC HEATING
Investigation of convective arcs for the simulation of reentry aerodynamic heating
[AD-785388] N75-12021
ARC WELDING
Properties of thick type 308 stainless steel welds with controlled residual elements
[ORNL-TM-4206] N75-12369
AREA
Method of measuring areas by a curvometer --- hydrographic areas from topographic maps
N75-12504
ARID LANDS
Dust storms according to data of space research --- spaceborne photography of arid zones
[NASA-TT-F-16021] N75-12463
ARIZONA
In situ spectroradiometric calibration of EREP imagery and oceanography of Block Island Sound --- Arizona geology
[E75-10042] N75-12411
ARKANSAS
Detection of moisture and moisture related phenomena from Skylab --- Kansas, Oklahoma, and Arkansas
[E75-10035] N75-12405
ARM [ANATOMY]
The mobility of the human arm: Motion analysis and possibilities of a simplified kinematical prosthetic system
N75-12551
Orthotic arm joint --- for use in mechanical arms
[NASA-CASE-MFS-21611-1] N75-12616
ARMED FORCES [UNITED STATES]
Some consequences of rapid managerial succession in complex organizations: A validation study
[AD-785442] N75-12844
ARMOR
Design and mockup evaluation of a high-strength armored crew seat for transport/cargo aircraft
[AD-785145] N75-11956
Properties and structure of some ceramics used for, or adapted for, lightweight armour
[FOA-4-C-4532-D6] N75-12148
ARRAYS
Skylab program payload integration. TO27 sample array
[NASA-CR-120531] N75-12011
Design, processing, and testing of LSI arrays for space station
[NASA-CR-120539] N75-12437
ARRHYTHMIA
New or newly tested methods for the assessment of pilots' workload --- conference
[DLR-MITT-74-19] N75-12605
Heart rate and sinusoidal arrythmia Measurement in view of objectivating concentration and stress in control tasks
N75-12608
ARTIFICIAL GRAVITY
Some regularities in adaptation to prolonged rotation --- improved human tolerance to weightlessness
N75-12562
ARTIFICIAL SATELLITES
Visible magnitude of typical satellites in synchronous orbits
[AD-785380] N75-12024
Stellar tracking attitude reference system
[NASA-CR-139158] N75-12026
ASPHALT
Skidproof dyes for concrete and asphalt
[FOA-2-C-2592-E6] N75-12333
ASSESSMENTS
Evaluating measures of workload using a flight simulator
N75-12591
ASTRONAUT TRAINING
Function of perception of space coordinates during vestibular trained by active, passive and complex methods
N75-12563
ASTRONOMICAL SPECTROSCOPY
Balloon-borne ultraviolet stellar spectrometer: Acquisition, tracking and command systems
N75-12755
ASTRONOMICAL TELESCOPES
Sky survey at far infrared wavelengths using a balloon-borne telescope
N75-12750
The stellar and solar tracking system of the Geneva Observatory gondola
N75-12753
Balloon infrared astronomy platform [BIRAP] --- development and characteristics of a balloon-borne attitude control system
N75-12759
ASTRONOMY
Soviet bloc research in geophysics, astronomy, and space, no. 337
[JPRS-63543] N75-12384
Soviet bloc research in geophysics, astronomy, and space, no. 336
[JPRS-63427] N75-12385
Telescope Systems for Balloon-Borne Research
[NASA-TM-X-62397] N75-12735
Astronomical observations with the University College London balloon borne telescope
N75-12738
AIROscope: Ames infrared balloon-borne telescope
N75-12747
Balloon platform for extended-life astronomy research
N75-12748
ATLANTIC OCEAN
An assessment of the potential contributions to oceanography from Skylab visual observations and hand-held photography --- Pacific Ocean, Atlantic Ocean and Gulf of Mexico
[E75-10017] N75-12396
Climatological elements of the coasts of Metropolitan France [Atlantic] --- wind, sea state, visibility, temperature
[MONO-93-VOL-2] N75-12484
Comparison of the diagnostic and forecasting calculations of currents in the lower part of the Atlantic Ocean
N75-12497
Some characteristics of the vertical structure of tropospheric currents in the tropical regions of the east Atlantic
N75-12500
The influence of surface waves on water circulation in a mid-Atlantic continental shelf region
[NASA-TN-D-7771] N75-12537
ATMOSPHERIC ATTENUATION
Atmospheric attenuation of aircraft noise. Experimental valves measured in a range of climatic conditions, volume 1
[HSA-HAD-R-GEN-214-VOL-1] N75-11979
Atmospheric attenuation of aircraft noise. Experimental valves measured in a range of climatic conditions, volume 2
[HSA-HAD-R-GEN-214-VOL-2] N75-11980
Measurement of CO2-laser radiation attenuation in the atmosphere
[FOA-2-C-2565-E3-E4-E6] N75-12299
Study of atmospheric effects in Skylab data
[E75-10006] N75-12391
Calculation of the absorption of X-ray radiation in the earth's atmosphere --- bremsstrahlung in stratosphere
[AD-785110] N75-12478
ATMOSPHERIC BOUNDARY LAYER
Study of the heat balance in the boundary layer of the atmosphere according to experimental data
N75-12514
ATMOSPHERIC CIRCULATION
Boundary layer aerosol transport measurements in a valley system
[AD-781010/4] N75-12477
Method of integrating the spectral equations of the planetary dynamics of the atmosphere
N75-12491
Procedure for five-day forecasting of significant and weak precipitation in the territory of Northern Kazakhstan in May - July
N75-12496
Effect of bottom relief on the geostrophic wind currents
N75-12498
ATMOSPHERIC COMPOSITION
Measurement of CO2-laser radiation attenuation in the atmosphere
[FOA-2-C-2565-E3-E4-E6] N75-12299
Studies of the airglow, the aurora, the ion and neutral composition, and the chemistry of the terrestrial atmosphere
[NASA-CR-140960] N75-12473
Aerostatic measurements of the vertical distribution of the atmospheric aerosol
[AD-785114] N75-12479
ATMOSPHERIC ENTRY
Reentry aerodynamic characteristics of a space shuttle solid rocket booster model 449 tested in MSFC 14 by 14 inch TWT [SA26F]
[NASA-CR-134435] N75-12022
Radiative property data for Venusian entry: A compendium
[NASA-SP-348] N75-12880
ATMOSPHERIC ENTRY SIMULATION
Investigation of convective arcs for the simulation of reentry aerodynamic heating
[AD-785388] N75-12021
ATMOSPHERIC MODELS
A mid-latitude ozone model for the US standard atmosphere, 1975 [summary]
[NASA-TM-X-70786] N75-12469
A three-dimensional numerical model of the upper atmosphere. Volume 2: Steady-state solutions for a single-fluid model with a fixed temperature field
[AD-778420] N75-12481
Problem of using asynchronous meteorological data
N75-12510
Problem of analytical solution of equations of dynamics for the model of an equivalent barotropic level of the atmosphere
[AD-785106] N75-12533
Jupiter radiation belt models [July 1974]
[NASA-CR-140845] N75-12869
ATMOSPHERIC MOISTURE
Atmospheric moisture parameterization --- spatial distribution of atmospheric moisture
[AD-784814] N75-12476
Statistical characteristics of the vertical moisture profile in the case of cumulus clouds
N75-12495
ATMOSPHERIC RADIATION
Complex studies of the stratospheric aerosol --- optical properties of aerosols and effects on stratospheric radiation
N75-12509
ATMOSPHERICS
Phase A conceptual design study of the Atmospheric, Magnetospheric and Plasmas in Space [AMPS] payload
[NASA-TM-X-64895] N75-12014
Reduction and error analysis of the AVE 2 pilot experiment data
[NASA-CR-120496] N75-12531
ATOMIC STRUCTURE
Electronic structure of hard superconductors --- establishment of cleaning procedures of niobium
[AD-785421] N75-12821
ATOMIZERS
A study on gas-liquid contact apparatus rotary atomizer
[BULL-93] N75-12231
ATOMIZING
Performance and durability of improved air-atomizing splash-cone fuel nozzles
[NASA-TM-X-3156] N75-12334
ATS 1
A proposal to study polarizations for hydromagnetic waves observed at ATS-1 --- using magnetometer
[NASA-CR-140857] N75-12464
ATTACK AIRCRAFT
Subsonic wind tunnel investigation of a twin-engine attack airplane model having nonmetric powered nacelles
[NASA-TN-D-7742] N75-11932
Information on attack helicopters: A comparison
[FOA-2-C-2597-F8] N75-11934
High workload tasks of aircrew in the tactical strike, attack and reconnaissance roles
N75-12601
ATTITUDE CONTROL
Stellar tracking attitude reference system
[NASA-CR-139158] N75-12026
Balloon infrared astronomy platform [BIRAP] --- development and characteristics of a balloon-borne attitude control system
N75-12759
AUGER SPECTROSCOPY
Basic research in scanning electron microscopy. --- using field emission guns and Elmiskope 101
[BMFT-FB-T-74-09] N75-12289
Application of Auger electron spectroscopy to electron probe microanalysis
N75-12290
AURORAS
Studies of the airglow, the aurora, the ion and neutral composition, and the chemistry of the terrestrial atmosphere
[NASA-CR-140960] N75-12473
AUSTENITIC STAINLESS STEELS
Study on development of high Mn austenitic heat resisting steel: Choice of base composition and the effect of small additions of Ti and Nb
[NASA-TT-F-16043] N75-12117
Tough cryogenic alloys from the Fe-Mn and Fe-Mn-Cr systems
[NASA-CR-134688] N75-12120
AUSTRALIA
A study of the usefulness of Skylab EREP data for earth resources studies in Australia --- Australia geology
[E75-10047] N75-12415
AUTOMATIC FLIGHT CONTROL
Investigation of pilot's role and display requirements in automatic landings
[NASA-CR-140844] N75-12617

AUTOMATION
An advanced air traffic management concept based on extensions of the upgraded third generation ATC system. System B: ATC automation analysis
[AD-785312] N75-11923
AUTOMOBILE ENGINES
Automobile emission standards
[S-REPT-93-598] N75-12452
Experiments with a catalytic cleaner for car engine exhaust gases
[FOA-1-C-1492-H3] N75-12455
AUTOMOBILES
Iron titanium hydride as a source of hydrogen fuel for stationary and automotive applications
[BNL-18651] N75-12441
AUTOROTATION
Engineering flight test, AH-1G helicopter, heavyweight autorotational evaluation
[AD-785553] N75-11964
AVALANCHE DIODES
Investigation of the physical origins of noise in Avalanche and Gunn oscillators and noise reduction techniques
[AD-780935/3] N75-12217
AVIONICS
A description of a life cycle cost model for inertial navigation systems --- using FORTRAN 4
[AD-785392] N75-11922
Cleaning and corrosion control of avionics equipment at all levels of maintenance
[AD-784975] N75-11968
AXIAL COMPRESSION LOADS
Buckling stress coefficients for thin-walled unstiffened circular cylinders under combined axial compression and internal pressure
[ESDU-04.01.01-AMEND-A] N75-12352
AXIAL FLOW
The effect of material damping on the dynamics of a vertical tubular cantilever conveying fluid
[MERL-TN-74-1] N75-12355
AXIAL FLOW TURBINES
Effect of blade row geometry on axial flow rotor unsteady response to inflow distortions
[AD-785276] N75-11991
AXISYMMETRIC BODIES
Ratio of axial and radial stiffness in an axisymmetric magnetic bearing
N75-12044
Principles of an axisymmetric MPD-accelerator with external magnetic field
N75-12785

B

BACKGROUND NOISE
Detectability of an unsharp edge in additive noisy background
[FOA-2-C-2591-E1-H5] N75-12577
BACKSCATTERING
Laser backscatter characteristics of materials of interest in Ballistic Missile Defense [BMD]
[AD-785393] N75-12323
BALL BEARINGS
Operating characteristics of 120-millimeter-bore ball
[NASA-TN-D-7837] N75-12330
BALLISTICS
Analysis of ballistic calibration data and government/contractor CEP test data with respect to the AN/TPQ-27 contract incentive fee determination
[AD-781373] N75-12709
BALLOON FLIGHT
NCAR telemetry and command system --- development of system for recovering and reproducing data from balloon-borne experiments
N75-12761
BALLOON-BORNE INSTRUMENTS
Balloon-borne aerosol counter modifications, particle sizing accuracy tests
[AD-784866] N75-12475
Telescope Systems for Balloon-Borne Research
[NASA-TM-X-62397] N75-12735
Balloon-borne infrared coronagraph --- application to solar observations
N75-12736
The 100 micron surveys in the Northern and Southern Hemispheres --- balloon-borne instrument general sky survey
N75-12737
Astronomical observations with the University College London balloon borne telescope
N75-12738
The Liege-balloon program --- balloon-borne instruments for high-spectral resolution observations of the sun
N75-12739
A balloon-borne 1 meter telescope for far-infrared astronomy
N75-12740
Multicolour far infrared photometry of galactic H2 regions --- data acquisition using high altitude balloons
N75-12741
Design and performance of a 39cm balloon-borne telescope
N75-12742
A cooled telescope for infrared balloon astronomy
N75-12744
A balloon-borne cryogenically cooled filter radiometer
N75-12745
Ultraviolet stellar spectrophotometry from a balloon platform
N75-12746
AIROscope: Ames infrared balloon-borne telescope
N75-12747
Balloon platform for extended-life astronomy research
N75-12748
Low-background air-infrared telescope for balloon-borne infrared astronomy
N75-12749
Sky survey at far infrared wavelengths using a balloon-borne telescope
N75-12750
Balloon-borne ultraviolet stellar spectrometer: Acquisition, tracking and command systems
N75-12755
Stabilization, pointing and command control of a balloon-borne 1-meter telescope
N75-12756
AIROscope stellar acquisition
N75-12757
The AIROscope pointing and stabilization system
N75-12758
Balloon infrared astronomy platform [BIRAP] --- development and characteristics of a balloon-borne attitude control system
N75-12759
A general purpose stabilised balloon platform
N75-12760
Airoscope telemetry system --- development of data link from balloon gondola to ground station
N75-12762
BAND STRUCTURE OF SOLIDS
Determination of contained functions in the modified-plane-wave method of band structure calculation
[AD-785515] N75-12823
BAROTROPIC FLOW
Problem of analytical solution of equations of dynamics for the model of an equivalent barotropic level of the atmosphere
[AD-785106] N75-12533
BEACHES
Spatial and temporal variations in geometric and material properties of a natural beach --- a study of shoreline erosion in California
[AD-785572] N75-12389
BEAM PLASMA AMPLIFIERS
Laser plasma studies with the Sandia four-beam system
[SLA-73-7064] N75-12304
BEAMS [SUPPORTS]
Thin-walled beam theory generalized to include thermal effects and arbitrary twist angle
[CRC-1253] N75-12363
Thermal ratcheting of a beam
[ANL-CT-74-16] N75-12371
BEARINGS
Measurement of axial and radial stiffness --- momentum wheel magnetic bearings
N75-12043
Ratio of axial and radial stiffness in an axisymmetric magnetic bearing
N75-12044
Study of repulsion bearings --- ratio of axial and radial stiffness
N75-12045
Calculations on an elementary fluid damper --- magnetic bearing supports
N75-12046
Principle of systems with Foucault current dissipation --- magnetic bearings damping
N75-12050
Test apparatus for motor and magnetic bearing
N75-12051
Study of the axial actuator --- magnetic bearing axial and radial stiffness
N75-12053
A self-lubricating bearing
[NASA-CASE-MFS-23009-1] N75-12328
BENDING VIBRATION
Calculation of the flapwise bending, edgewise bending, and torsional vibrations of rotor blades with coupled natural modes and frequencies
[NASA-TT-F-16004] N75-11892
BIBLIOGRAPHIES
Particle registration in dielectric materials: A bibliography
[UCRL-51568] N75-12726
Personnel management --- bibliography
[AD-785350] N75-12846
Bibliography of bibliographies in the DDC collection
[AD-780700/1] N75-12851
BIGHORN MOUNTAINS [MT-WY]
Experiment to evaluate feasibility of utilizing Skylab-EREP remote sensing data of tectonic analysis of the Bighorn Mountains region, Wyoming-Montana --- Black Hills, South Dakota/Wyoming
[E75-10014] N75-12395
BINARY ALLOYS
Hardness behavior of binary and ternary niobium alloys at 77 and 300 K
[NASA-TN-D-7847] N75-12127
BINARY STARS
A new measurement of the Her X-1 X-ray pulse profile
[NASA-TM-X-70578] N75-12863
BIOCLIMATOLOGY
Evapotranspiration: Agrometeorological aspect and evaluation of potential evapotranspiration
[MONO-65] N75-12482
BIODYNAMICS
Collaborative research in cardiovascular dynamics and bone elasticity
[NASA-CR-140997] N75-12572
Model of human dynamic orientation --- associated with vestibular stimuli
[NASA-CR-132537] N75-12585
BIOLOGICAL EFFECTS
Mathematical model describing the influence of biological and physical processes on the biological conditions in a sea
[PT-1972:5] N75-12538
BIOMETRICS
Error control in estimation of pilot stress by measuring skin resistance
N75-12610
BIOTELEMETRY
United States Navy physiological telemetry system operation and maintenance manual --- for conveying heart rate and core temperature
[AD-785273] N75-12619
BIRDS
Radar studies of bird migration
[NASA-CR-139802] N75-12544
BLACK HILLS [SD-WY]
Experiment to evaluate feasibility of utilizing Skylab-EREP remote sensing data of tectonic analysis of the Bighorn Mountains region, Wyoming-Montana --- Black Hills, South Dakota/Wyoming
[E75-10014] N75-12395
Inventory of forest and rangeland resources, including forest stress --- Colorado, Georgia, and Black Hills, South Dakota
[E75-10032] N75-12402
BLACK HOLES [ASTRONOMY]
What is special about Cygnus X-1? --- evidence for a black hole
[NASA-TM-X-70791] N75-12862
BLAST LOADS
Comparison of the results of the dynamic response of cylindrical shells by finite element methods: Axisymmetric case
[AD-785258] N75-12381
The tolerance of birds to airblast
[AD-785259] N75-12550
BLINDNESS
Laser cane for the blind
[FOA-2-C-2595-H5] N75-12300
BLOCK ISLAND SOUND [RI]
In situ spectroradiometric calibration of EREP imagery and oceanography of Block Island Sound --- Arizona geology
[E75-10042] N75-12411
BLOOD
Phagocytic activity of human blood neutrophils under ordinary conditions of vital functioning and in an isolation chamber
N75-12571
BLUNT BODIES
Hypersonic flow around blunt body at angles of attack
[ISAS-515-VOL-39-12] N75-12246
Numerical solutions to the full viscous shock layer equations using an alternating direction implicit technique
[AD-785242] N75-12256
BOATTAILS
An improved projectile boattail
[AD-785520] N75-11900
Experimental magnus characteristics of several ballistic projectiles with various boattail angles and lengths at Mach numbers 1.5, 2.0, and 1.5
[AD-785346] N75-11908
BODY KINEMATICS
The mobility of the human arm: Motion analysis and possibilities of a simplified kinematical prosthetic system
N75-12551
BODY VOLUME [BIOLOGY]
Respiratory activity sensor using conducting paper
N75-12569
BODY-WING CONFIGURATIONS
Theoretical prediction of thick wing and pylon-fuselage-fanpod-nacelle aerodynamic characteristics at subcritical speeds. Part 1: Theory and results
[NASA-CR-137578] N75-11935

Theoretical prediction of thick wing and pylon-fuselage-fanpodinacelle aerodynamic characteristics at subcritical speeds. Part 2: Computer program description
[NASA-CR-137579] N75-11936
BOEING 727 AIRCRAFT
A 727/JT8D-100 series engine exhaust system propulsion performance model test
[NASA-CR-134617] N75-11984
BOLTZMANN TRANSPORT EQUATION
On master Boltzmann equation
[ISAS-516-VOL-39-13] N75-12678
Effect of charge exchange reactions on neoclassical transport
[ORNL-TM-4606] N75-12727
BOMBING EQUIPMENT
Analysis of ballistic calibration data and government/contractor CEP test data with respect to the AN/TPQ-27 contract incentive fee determination
[AD-781373] N75-12709
BONDING
Analysis and design of composite bonded joints under a dynamic type load
[AD-785433] N75-12375
Electronic structure and bonding of actinide complexes --- using Hartree approximation
[COO-3077-53] N75-12816
BONES
Ultrasonic bone densitometer
[NASA-CASE-MFS-20994-1] N75-12271
Collaborative research in cardiovascular dynamics and bone elasticity
[NASA-CR-140997] N75-12572
Determination of total body calcium [skeletal mass] in man by in vivo neutron activation analysis and total body counting
[TID-26613] N75-12581
BOOSTER ROCKET ENGINES
Reentry aerodynamic characteristics of a space shuttle solid rocket booster model 449 tested in MSFC 14 by 14 inch TWT [SA26F]
[NASA-CR-134435] N75-12022
BOOSTGLIDE VEHICLES
Ground effect devices for transport of personnel and goods over short distances using air suspension
[FOA-2-A-2566-F8[F3]] N75-11897
BOUNDARY LAYER FLOW
Numerical study of separated turbulent flows
N75-12226
Application of wave mechanics theory to fluid dynamics problems: Boundary layer on a circular cylinder including turbulence
[NASA-CR-140849] N75-12230
Similarity solutions of the boundary layer equations for flow over a moving wall
[AD-781496/5] N75-12259
BOUNDARY LAYER SEPARATION
Status of flow separation prediction in liquid propellant rocket nozzles
[NASA-TM-X-64890] N75-12061
Numerical study of separated turbulent flows
N75-12226
Nonuniform grid method for turbulent boundary layers
[SAND-74-5023] N75-12253
Analytical study of subsonic turbulent boundary layer separation including viscous-inviscid interaction
[NASA-CR-140958] N75-12254
BOUNDARY LAYER TRANSITION
Disturbances in a wall boundary layer introduced by an array of low-intensity vortices
[AD-785394] N75-12268
BOUNDARY LAYERS
An assessment of the potential contributions to oceanography from Skylab visual observations and hand-held photography --- Pacific Ocean, Atlantic Ocean and Gulf of Mexico
[E75-10017] N75-12396
Lunar particle shadows and boundary layer experiment: Plasma and energetic particles on the Apollo 15 and 16 subsatellites
[NASA-CR-140371] N75-12871
BOUNDARY VALUE PROBLEMS
Numerical solutions to the full viscous shock layer equations using an alternating direction implicit technique
[AD-785242] N75-12256
Conversion of boundary-value problems into stable initial-value problems via several invariant imbedding algorithms
[SAND-74-5018] N75-12644
Comparison of some codes for the initial value problem for ordinary differential equations
[SLA-74-5319] N75-12681
Electromagnetic fluctuations in the half-space of nonequilibrium plasma
[ITF-74-23P] N75-12799
BRASSES
Chromate passivation of brass --- using ammonium silver nitrate spot test and selenium acid test
[TN-341] N75-12122
BRAZING
Characterization of exothermic brazing components Skylab experiment M552
[NASA-CR-120518] N75-12015
BREMSSTRAHLUNG
Calculation of the absorption of X-ray radiation in the earth's atmosphere --- bremsstrahlung in stratosphere
[AD-785110] N75-12478
BROADBAND
Studies of monochromatic, quasi-monochromatic and broadband imaging techniques: A generalized imaging integral
[AD-785269] N75-12770
BROMIDES
The viscosity of indium [3] halides
N75-12072
Determination of mercury by controlled potential coulometry: An outlay for automatic performance
[EUR-5125] N75-12103
BUBBLE TECHNIQUE
Measurements of gas component and duration time in the liquid phase of two and three component systems in bubble column reactors --- for aerobic fermentation
N75-12285
BUCKLING
Buckling stress coefficients for thin-walled unstiffened circular cylinders under combined axial compression and internal pressure
[ESDU-04.01.01-AMEND-A] N75-12352
BUTTERFLY VALVES
Constant-volume gas turbine: Experiments with gaseous fuel in butterfly valved combustors
[ARL/ME-NOTE-347] N75-11976
BYPASSES
Propulsion concepts for STOL aircraft --- high bypass turbofan engines and air supply system for wings with internally blown flaps
N75-11948

C

C-5 AIRCRAFT
A spectrum truncation and damage tolerance study associated with the C-5A outboard pylon aft truss lugs
[AD-785196] N75-11955
C-130 AIRCRAFT
Program for establishing long-time flight service performance of composite materials in the center wing structure of C-130 aircraft. Phase 3: Fabrication
[NASA-CR-132495] N75-11937
CALCIUM
Ultrasonic bone densitometer
[NASA-CASE-MFS-20994-1] N75-12271
Determination of total body calcium [skeletal mass] in man by in vivo neutron activation analysis and total body counting
[TID-26613] N75-12581
CALCIUM COMPOUNDS
Determination of mercury by controlled potential coulometry: An outlay for automatic performance
[EUR-5125] N75-12103
CALIBRATING
Inaccuracy in measurements and calibrations
[FOA-3-C-3734-E8] N75-12206
Calibration of the DSL 50 ton-force [500 kN] single-lever primary standard of force
[DSL-551] N75-12331
Calibration of a 1 to 10kg set of masses --- designing a calibration scheme
[TN-352] N75-12706
CALIFORNIA
Spatial and temporal variations in geometric and material properties of a natural beach --- a study of shoreline erosion in California
[AD-785572] N75-12389
Fog and wind regimes of the Eureka-Arcata coastal region of northern California
[AD-785531] N75-12534
CAMERAS
Sample test reports for camera, still picture, KA-91B --- performance tests of camera for aerial reconnaissance
[AD-785399] N75-12294
CANADA
Proceedings of the Canadian Workshop on acoustic surface waves
[CRC-1260] N75-12696
Introduction to the proceedings of the Canadian workshop on acoustic surface waves
N75-12697
CANTILEVER MEMBERS
The effect of material damping on the dynamics of a vertical tubular cantilever conveying fluid
[MERL-TN-74-1] N75-12355
CAPTIVE TESTS
Environmental investigation of pilot propulsion test sled
[AD-785134] N75-12010
CARBOHYDRATE METABOLISM
Content of glycogen and glucoso-6-phosphatase activity in the tissues of rabbits after prolonged exposure to the increased pressure of a helium-oxygen atmosphere
N75-12558
Activity of blood enzymes in rabbits exposed to high-mountain hypoxia
N75-12559
CARBON
Pyrocarbon and its application to reactor technology
[GERHTR-86] N75-12080
Plasma chemistry and the dynamics of carbon foils irradiated by high intensity laser pulses
[LA-5532-MS] N75-12794
CARBON DIOXIDE
Optimization of carbon dioxide gas turbine loops
N75-11975
Infrared radiation from H2O, CO2 or NH3 collisionally excited by N2, O or Ar
[AD-785412] N75-12827
CARBON DIOXIDE LASERS
Communication link with CO2 laser
[FOA-2-C-2584-E2] N75-12176
Measurement of CO2-laser radiation attenuation in the atmosphere
[FOA-2-C-2565-E3-E4-E6] N75-12299
Measure of the characteristics of TEA CO2 amplifier and experimental study of the propagation of a laser pulse with an exponential front in the amplifying media and absorption at 10.6 microns
[DREV-R-710/74] N75-12301
Influence of tool feed [IN/REV] on the machinability of CO2 laser optics
[Y-DA-5786] N75-12305
ARPA-NRL laser program --- chemical, gas, and infrared lasers
[AD-785234] N75-12315
Frequency tuned CO2 laser
[AD-785180] N75-12317
Application of a single laser Doppler system to the measurement of atmospheric winds
[NASA-TM-X-64891] N75-12462
On producing a CO2-laser medium for high output with an electric discharge in a supersonic flow
N75-12791
CARBON FIBERS
The effect of neutron irradiation on the structure and mechanical properties of carbon fibres
[ARL/MET-REPT-93] N75-12078
A three-dimensional structure model for a high modulus pan-based carbon fiber
[AD-784415] N75-12085
CARBON MONOXIDE
Stellar content of the nuclei of elliptical galaxies determined from 2.3 micron CO band strengths
[NASA-CR-140859] N75-12861
CARBONACEOUS ROCKS
Differential capacitance study on the edge orientation of pyrolytic graphite and glassy carbon electrodes
[AD-785263] N75-12083
CARDIOVASCULAR SYSTEM
Collaborative research in cardiovascular dynamics and bone elasticity
[NASA-CR-140997] N75-12572
The control of the cardiovascular and central nervous system --- under acceleration stress
[AD-784933] N75-12582
CARGO AIRCRAFT
Design and mockup evaluation of a high-strength armored crew seat for transport/cargo aircraft
[AD-785145] N75-11956
CARIBBEAN SEA
Total heat transfer to the atmosphere from the ocean surface in the vicinity of formation of Hurricane Hilda
N75-12516
CARRIER WAVES
Wave interactions in lossy periodic media
[AD-784660] N75-12826
CASCADE FLOW
Cascade tests of serrated leading edge blading at high subsonic speeds
[NASA-CR-2472] N75-11983
CASSEGRAIN OPTICS
A cooled telescope for infrared balloon astronomy
N75-12744
A balloon-borne cryogenically cooled filter radiometer
N75-12745
CATALYSIS
Catalytic breakdown of hydrazine
[FOA-1-C-1488-D3] N75-12134
CATALYSTS
Experiments with a catalytic cleaner for car engine exhaust gases
[FOA-1-C-1492-H3] N75-12455
CATARACTS
Peculiarities in the formation of cataracts in mice after irradiation by 645 MeV protons and Co60 gamma rays
N75-12557
CATEGORIES
Information theory aspects of long range analyses
[FOA-2-C-2568-E1] N75-12848
CAVITATION FLOW
Erosive destruction by cavitation flow
N75-12237
The cavitation laboratory of the Swedish state shipbuilding experimental tank
[CIRC-32] N75-12250

CELLS [BIOLOGY]
Changes in mass of biological cells when irradiated with Q-pulsed ruby laser
[FOA-2-C-2586-E6] N75-12578
CENTRAL ATLANTIC REGIONAL ECOL TEST SITE
Urban and regional land use analysis: CARETS and census cities experiment package
[E75-10019] N75-12398
CENTRAL NERVOUS SYSTEM
Effect of 30-day hypokinesia on the dynamics of higher nervous activity and sleep of an operator
N75-12566
The control of the cardiovascular and central nervous system --- under acceleration stress
[AD-784933] N75-12582
CENTRAL PROCESSING UNITS
Taxicrinic processors of the Illiac 3: Architectural design
[TID-26602] N75-12664
CENTRIFUGES
The 20,000-RPM centrifuge --- design of portable spin test equipment
[SLA-74-204] N75-12336
CERAMICS
Properties and structure of some ceramics used for, or adapted for, lightweight armour
[FOA-4-C-4532-D6] N75-12148
Proposed method and device for obtaining piezoelectric constants of ceramic cylindrical shells
[AD-785008] N75-12150
Strength and durability of a glass-ceramic containing spodumene crystals
[AD-783087/0] N75-12151
Thermal and acoustic fatique of ceramics and their evaluation
[AD-785547] N75-12152
CESIUM IODIDES
Stimulated chemiluminescence in the alkalihalides
[TN-336] N75-12091
CH-47 HELICOPTER
U. S. Army helicopter electrical system reliability and maintainability investigation. Volume 1: Document deficiency analysis
[AD-785573] N75-11961
U. S. Army helicopter electrical system reliability and maintainability investigation. Volume 2: Supplemental design guide
[AD-785574] N75-11962
CH-54 HELICOPTER
Major Item Special Study [MISS], CH-54A rotary wing blade
[AD-785554] N75-11906
CHANNEL FLOW
Similarity solutions of the boundary layer equations for flow over a moving wall
[AD-781496/5] N75-12259
CHARACTERIZATION
Characterization and evaluation of materials for magnetic domain propagation [orthoferrites, garnets]
[REPT-8562] N75-12194
CHARGE EXCHANGE
Effect of charge exchange reactions on neoclassical transport
[ORNL-TM-4606] N75-12727
CHEMICAL COMPOSITION
Study on development of high Mn austenitic heat resisting steel: Choice of base composition and the effect of small additions of Ti and Nb
[NASA-TT-F-16043] N75-12117
CHEMICAL ELEMENTS
Application of Auger electron spectroscopy to electron probe microanalysis
N75-12290
CHEMICAL ENGINEERING
Chemical reaction engineering
[FOA-1-C-1515-H3] N75-12073
CHEMICAL LASERS
Laser Doppler velocimetry in chemical laser studies
[SAND-74-5006] N75-12311
Metal oxidation laser
[AD-784760] N75-12312
ARPA-NRL laser program --- chemical, gas, and infrared lasers
[AD-785234] N75-12315
Exploratory studies of dif.. .sion laser modifications --- modification in HF DF gas laser
[AD-785400] N75-12322
CHEMICAL MACHINING
Chemical milling --- the selective or overall removal of high strength, heat resistant metals and alloys from metal parts
[SLL-74-5001] N75-12164
CHEMICAL REACTIONS
Chemical reaction engineering
[FOA-1-C-1515-H3] N75-12073
The effect of hafnium in unalloyed construction steels similar to St 52-3, considering especially the hot forming behavior of sulfidic inclusions
N75-12121
Procedure for the isolation and determination of aldosterone in human urine by thin-film chromatography on polyamide and BTC micro-reaction
[RAE-LIB-TRANS-1778] N75-12579
CHEMILUMINESCENCE
Stimulated chemiluminescence in the alkalihalides
[TN-336] N75-12091
CHEST
Respiratory activity sensor using conducting paper
N75-12569
CHICKENS
The tolerance of birds to airblast
[AD-785259] N75-12550
CHLORATES
The semimicro determination of potassium chlorate and lead thiocyanate in priming compositions
[DSL-TN-339] N75-12093
CHLORELLA
Investigation of the dynamics of accumulation of trace elements by chlorella cells during prolonged cultivation
N75-12560
CHROMATES
Chromate passivation of brass --- using ammonium silver nitrate spot test and selenium acid test
[TN-341] N75-12122
CHROMIUM
Refinement in black chrome for use as a solar selective coating
[NASA-TM-X-3136] N75-12329
CIRCULAR CYLINDERS
Sweep effect on the drag of rows of perpendicular circular cylinders in a laminar boundary layer at supersonic free-stream velocities
[NASA-TN-D-7812] N75-12235
Buckling stress coefficients for thin-walled unstiffened circular cylinders under combined axial compression and internal pressure
[ESDU-04.01.01-AMEND-A] N75-12352
CITIES
Urban and regional land use analysis: CARETS and census cities experiment package
[E75-10019] N75-12398
In the interests of clean air --- in Kiev, Ukraine
[AD-785206] N75-12460
Remote sensing utility in a disaster struck urban environment
[NASA-CR-140801] N75-12858
Computer program for town analysis. Changes arising from converting from IBM 7090 to IBM 360/75 --- computerized rescue operations simulation
[FOA-4-C-4515-A4] N75-12859
CIVIL AVIATION
Technical problems encountered in the study of a dirigible freighter
[CEA-CONF-2580] N75-11899
CIVIL DEFENSE
Computer program for town analysis. Changes arising from converting from IBM 7090 to IBM 360/75 --- computerized rescue operations simulation
[FOA-4-C-4515-A4] N75-12859
CLASSIFICATIONS
Obtaining initial vectors for minimizing the probability of misclassification
[NASA-CR-140348] N75-12675
CLIMATE
Empirical model of the root system of winter wheat considering weather conditions and the soil moisture distribution by layers
N75-12499
Future climate --- effects of modern economic activity
N75-12508
Reconstruction of past climatic variability
[AD-785395] N75-12536
CLIMATOLOGY
Meteorology and hydrology, no. 8, 1974 --- climatology, agriculture meteorology, weather forecasting, and hydrology
[JPRS-63560] N75-12488
Meteorology and hydrology, no. 9, 1974 --- microclimatology, agricultural meteorology, weather forecasting, climate control, and hydrological forecasting
[JPRS-63569] N75-12507
Computer treatment of climatic research data. Table type B
[FOA-1-C-1504-M4[H5-H6]] N75-12624
CLOUD COVER
Methods of calculating the variations in the total flux of radiant energy for purposes of long range forecasting of large scale meteorological fields
N75-12490
CLOUD PHOTOGRAPHY
A cloud physics investigation utilizing Skylab data
[E75-10021] N75-12400
CLOUD PHYSICS
A cloud physics investigation utilizing Skylab data
[E75-10021] N75-12400
Atmospheric moisture parameterization --- spatial distribution of atmospheric moisture
[AD-784814] N75-12476
COAL GASIFICATION
Process environment effects on heat pipes for fluidbed gasification of coal
[LA-UR-74-984] N75-12252
Coal conversion and usage: A systems study
[NASA-TM-X-58157] N75-12434
COAL UTILIZATION
Coal conversion and usage: A systems study
[NASA-TM-X-58157] N75-12434
COASTAL ECOLOGY
Definition of heavy industry, guidelines for acceptable manufacturing uses, and plan for manufacturing gases in Delaware's coastal zone
N75-12855
Public land use controls in Delaware's coastal zone
N75-12856
COASTS
Climatological elements of the coasts of Metropolitan France [Atlantic] --- wind, sea state, visibility, temperature
[MONO-93-VOL-2] N75-12484
COATINGS
Refinement in black chrome for use as a solar selective coating
[NASA-TM-X-3136] N75-12329
COAXIAL PLASMA ACCELERATORS
Theoretical investigations on the coaxial accelerator with compression coil --- for the simulation of micrometeorides
N75-12782
COBALT ALLOYS
Momentum wheel - magnetic suspension losses by Eddy currents --- for samarium cobalt magnets
N75-12042
The resistance of selected high strength alloys to embrittlement by a hydrogen environment --- iron and cobalt base alloys
[NASA-CR-140957] N75-12115
Research in the production of rare-earth-cobalt permanent magnet material by sputter deposition
[AD-785358] N75-12166
COBALT COMPOUNDS
Hydrogen solubility in 1:5 compounds between Y or Th and Ni or Co
[COO-3429-19] N75-12076
Solubility of H2 in RCo3 compounds
[COO-3429-20] N75-12108
COCKPIT SIMULATORS
Application of human factors engineering data in medical evaluation of flight crews
N75-12611
COEFFICIENTS
The automatic computation of the coefficients in a class of modified multistep methods
[FOA-2-C-2571-M4] N75-12676
COHERENT LIGHT
Laser pulse propagation code
[LA-5607-MS] N75-12307
Lamp code users guide --- numerical analysis of laser outputs in either active or passive host media
[UCID-16525] N75-12310
COHERENT RADIATION
Long range materials research --- generation of coherent vacuum ultraviolet radiation and soft X-rays
[AD-784962] N75-12140
Effects of high power lasers, no. 3
[AD-785401] N75-12316
COLLISION AVOIDANCE
Synchronization station location study: Tradeoff phase
[AD-785335] N75-11921
COLLISIONLESS PLASMAS
A shear flow instability due to the finite ion gyroradius
[MPI-PAE/EXTRATERR-96] N75-12774
COLOR TELEVISION
Colour television displays: Error diagrams for evaluating the reproduced chromaticities of some test colours --- reproduction by phosphors
[BBC-RD-1974/34] N75-12733
COLORADO
An interdisciplinary analysis of multispectral satellite data for selected cover types in the Colorado Mountains, using automatic data processing techniques --- hydrology, ecology, geology, vegetation, and mineral deposits
[E75-10002] N75-12390
Inventory of forest and rangeland resources, including forest stress --- Colorado, Georgia, and Black Hills, South Dakota
[E75-10032] N75-12402
Index of Skylab data available at Colorado School of Mines --- multispectral photography of Colorado
[E75-10011] N75-12410
Geologic and mineral and water resources investigations in Western Colorado, using Skylab EREP data --- Utah
[E75-10043] N75-12412
COLUMNS [PROCESS ENGINEERING]
Measurements of gas component and duration time in the liquid phase of two and three component systems in bubble column reactors --- for aerobic fermentation
N75-12285
COMBAT
Simulation of high workload operations in air to air combat
N75-12593
COMBUSTION
Combustion generated noise in turbopropulsion systems
[AD-785485] N75-11990

Combustion mechanism of particles of aluminum-magnesium alloys
[AD-785205] N75-12110
Method of sampling particles formed during burning of metallized condensed systems in constant-pressure chamber
[AD-785212] N75-12114
Burn characteristics of marginal deuterium-tritium microspheres
[LA-5603-MS] N75-12729

COMBUSTION CHAMBERS
Fundamental and applied research on core engine/combustion noise of aircraft engines
[NASA-CR-140860] N75-11974
Constant-volume gas turbine: Experiments with gaseous fuel in butterfly valved combustors
[ARL/ME-NOTE-347] N75-11976
Research on noise generated by ducted air-fuel combustion systems
[AD-785028] N75-11992
Effect of Oxygen addition on altitude blowout and relight of an experimental combustor segment
[NASA-TM-X-3154] N75-12070

COMBUSTION PHYSICS
Is MHD dead? --- in terms of its uses in energy conversion and combustion technology
N75-12780

COMBUSTION PRODUCTS
Methods of cleaning and servicing air supplies, and their control
[FOA-1-A-1561-H3] N75-12453

COMETS
Mission design for a ballistic slow flyby Comet Encke 1980
[NASA-TN-D-7726] N75-12012

COMMERCIAL AIRCRAFT
The airline minimum fleet problem --- development of algorithms for optimization of airline operations
[AERO-TN-7403] N75-11909

COMMUNICATION EQUIPMENT
An advanced air traffic management concept based on extensions of the upgraded third generation ATC system. System B: System cost analysis
[AD-785313] N75-11924
The National Scientific Balloon Facility --- balloon launching capabilities of ground facility
N75-12751
Airoscope telemetry system --- development of data link from balloon gondola to ground station
N75-12762
Airoscope command system --- pulse code modulation telemetry command system for data link with balloons
N75-12763

COMMUNICATION SATELLITES
The analysis and design of satellite stabilisation systems using ion propulsion
[RAE-LIB-TRANS-1775] N75-12027

COMMUNICATION THEORY
Design of a secure data transmission system: An implementation of communication theory using a microcomputer
[UCRL-51587] N75-12625
Empirical findings and suggestions for future research on organizational communication
[AD-785002] N75-12843

COMMUNITIES
Short course on STOL aircraft technology and the community, volume 1
N75-11938
Short course on STOL aircraft technology and the community, volume 2
N75-11946

COMPLEX SYSTEMS
Topics in the analysis and optimization of complex systems --- using maximum likelihood estimates
[AD-785415] N75-12689

COMPONENTS
A look at the future of electronic components
[FTL-A-A28:1] N75-12210

COMPOSITE MATERIALS
Program for establishing long-time flight service performance of composite materials in the certer wing structure of C-130 aircraft. Phase 3: Fabrication
[NASA-CR-132495] N75-11937
Molding of oriented short-fiber composites. 4: Characterization of fiber orientation patterns
[AD-785266] N75-12084
Materials research in support of superconducting machinery
[AD-780596/3] N75-12138
Fabrication of a conical composite stiffening rib --- for reentry vehicles
[SLA-74-277] N75-12370
Analysis and design of composite bonded joints under a dynamic type load
[AD-785433] N75-12375
Estimated quantities of materials contained in a 1000-MW[e] PWR power plant
[ORNL-TM-4515] N75-12721

COMPRESSIBILITY
Density and compressibility studies on homologous rows of ethers, ketones, dioles up to 4000 bar and 80 C
N75-12098

COMPRESSIBLE FLOW
One-dimensional compressible gas flow in ducts
[ESDU-74028] N75-12223
Subcritical and supercritical compressible flows without shock in vane meshes
[AAAF-NT-74-1] N75-12225

COMPRESSING
Theoretical investigations on the coaxial accelerator with compression coil --- for the simulation of micrometeorides
N75-12782

COMPRESSION LOADS
Calculation of bearing loads and displacement paths in fast running high performance diesel engines at different point loads with emphasis on speed drop
N75-12332

COMPTON EFFECT
QUICKE2: A one-dimensional code for calculating bulk and vacuum emitted photocompton currents
[SLL-74-218] N75-12817

COMPUTATION
The automatic computation of the coefficients in a class of modified multistep methods
[FOA-2-C-2571-M4] N75-12676

COMPUTER DESIGN
Optimal design of recursive digital filters
[AD-785571] N75-12216

COMPUTER GRAPHICS
Image selection system --- computerized data storage and retrieval system
[NASA-CR-2475] N75-12422
Routines for using screen presentation of EMR 6130 equipment --- written in FORTRAN
[FOA-3-C-3727-E5] N75-12637
Interactive digital image processing and display system
[UCRL-75655] N75-12646
Barely intelligent terminal
[LBL-2676] N75-12661
Time series model for texture synthesis
[TID-26599] N75-12692

COMPUTER PROGRAMMING
The Mark 4 supersonic-hypersonic arbitrary body program. Volume 3: Program listings
[AD-778445] N75-12057
Transmission models for microwave microelectronics using thin films on ferrimagnetic substrates
[REPT-1230/73-143] N75-12192
Natural science research application of methods of teaching a machine pattern recognition without a teacher
[JPRS-63501] N75-12632
Supporting program and program system for the assembly program in Tiros
[FOA-1-C-1470-C4] N75-12633
Introduction to the structure of dialogue directed computer programs
[FOA-P-C-8361-M3] N75-12638
Experiment with methodologies for the specification of programming systems
[UCLA-10-P-14-128] N75-12643
Conversion of boundary-value problems into stable initial-value problems via several invariant imbedding algorithms
[SAND-74-5018] N75-12644
Department of defense space shuttle on-board software requirements
[AD-785123] N75-12648
A compilation of papers presented at the On-Axis Software Conference
[AD-785218] N75-12649
Heuristic-adaptive search for regimes in a string of data
[AD-784473] N75-12650
Combined use of Tiros and DETEF systems for programming, data collection and evaluation of data output
[FOA-1-C-1474-C4] N75-12653
FOA Index adaptation of ILO's information system ISIS for operating in the Computer Center, Stockholm in cooperation with the State Office
[FOA-P-C-8360-M7] N75-12654
A program for listing card indices for A4 reports
[FOA-2-C-2589-E5] N75-12658
Coordination of critical access to distributed databanks in computer networks based on decentralized control
[KFK-1967] N75-12663
Natural communication with Computers 4
[AD-784231] N75-12667
Some techniques for testing pseudo-random number sequences
[AD-785379] N75-12688
Discrete-time domain analysis of a two-axis beam deflector
[AD-785133] N75-12773
Computer program for town analysis. Changes arising from converting from IBM 7090 to IBM 360/75 --- computerized rescue operations simulation
[FOA-4-C-4515-A4] N75-12839
Calculating the daily variations of solar energy incident on flat plates
[ORNL-TM-4564] N75-12886
LYSTER: Air defence surface protection capability in Swedish terrain
[FOA-P-C-8349-M1] N75-12890

COMPUTER PROGRAMS
FORTRAN program for calculating the trajectory of projectiles
[FOA-2-A-2564-D8] N75-11894
Omega flight-test data reduction sequence --- computer programs for reduction of navigation data
[NASA-CR-140827] N75-11911
Theoretical prediction of thick wing and pylon-fuselage-fanpod-nacelle aerodynamic characteristics at subcritical speeds. Part 2: Computer program description
[NASA-CR-137579] N75-11936
User's guide to four-body and three-body trajectory optimization programs
[NASA-CR-139156] N75-12020
Design of the software development and verification system [SWDVS] for shuttle NASA study task 35
[NASA-CR-140341] N75-12038
The Mark 4 supersonic-hypersonic arbitrary body program. Volume 1: User's manual
[AD-778443] N75-12056
GAUST: A computer program for calculating gas flow from holders containing condensed gas
[FOA-1-C-1498-C3[H6]] N75-12247
Application of the least square method to magnetic resonance techniques
[CEA-R-4511] N75-12346
Multilevel model for the synthesis of reliable programs --- applications of computer language for program improvement
[UCLA-10-P-14-126] N75-12347
Computer generated troubleshooting trees: The program
[AD-785139] N75-12350
The use of geometric programming methods for structural optimization
N75-12360
Sizing of complex structure by the integration of several different optimal design algorithms
[L-9738] N75-12361
Computer treatment of climatic research data: Table type A
[FOA-1-C-1503-M4[H5-H6]] N75-12530
Reduction and error analysis of the AVE 2 pilot experiment data
[NASA-CR-120496] N75-12531
A system of computer programs for recording the activity of mice
[FOA-1-C-1478-M4] N75-12545
Computer treatment of climatic research data. Table type B
[FOA-1-C-1504-M4[H5-H6]] N75-12624
Neighboring optimal guidance theory and computer program
[NASA-CR-140332] N75-12631
LECO: A compacting and editing program
[FOA-P-C-8353-M3[E5]] N75-12634
Introduction to LECO
[FOA-P-C-8355-M3[E5]] N75-12635
A computer programme for flowfield predictions in the interaction of a shock wave with a 90 degree bend
[REPT-58] N75-12640
REBAL computer program series for linear propagation of uncertainty
[ANCR-1153] N75-12641
Application software for electron microprobe analysis and data reduction
[SLL-74-5] N75-12642
User's guide for program ISOPLT to plot isotherms
[SLA-74-242] N75-12647
A decomposition method for the solution of dual-angular integer programs
[AD-785568] N75-12651
Duration of program for program optimization
[FOA-P-C-8350-M3[E5]] N75-12655
X-FOC: A help program for 8-16 K TIROS-FOCAL
[FOA-1-C-1507-C2[C4]] N75-12659
The automatic computation of the coefficients in a class of modified multistep methods
[FOA-2-C-2571-M4] N75-12676

COMPUTER STORAGE DEVICES
The deposition of Er-Eu-Ga-F c0e garnet single crystal films
[AD-785511] N75-12111
Introduction to LECO
[FOA-P-C-8355-M3[E5]] N75-12635
X-FOC: A help program for 8-16 K TIROS-FOCAL
[FOA-1-C-1507-C2[C4]] N75-12659
Introduction to RATS [RISOS/ARPA Terminal System]: An operating system for the DEC PDP-11/45
[UCRL-51582] N75-12662

COMPUTER SYSTEMS DESIGN
New version of the program for operative objective analysis of the geopotential of isobaric surfaces
N75-12511
A study of language directed computer design
[CSRG-20] N75-12623
Possibilities for the construction of various types of multi-value adders from mixers, switches, and spectrotrons
[AD-781323/1] N75-12626

NBS FORTRAN test programs. Volume 2: Listings for version 1
[NBS-SP-399-VOL-2] N75-12628
A system for input and output of digital pictures
[FOA-2-C-2573-E1] N75-12660
Taxicrinic processors of the Illiac 3: Architectural design
[TID-26602] N75-12664

COMPUTER SYSTEMS PROGRAMS
Design of the software development and verification system [SWDVS] for shuttle NASA study task 35
[NASA-CR-140341] N75-12038
NBS FORTRAN test programs. Volume 3: Listings for Version 3
[NBS-SP-399-VOL-3] N75-12629
PL360 compiler with macros
[FOA-P-C-8359-M3[E5]] N75-12639
Experiment with methodologies for the specification of programming systems
[UCLA-10-P-14-128] N75-12643

COMPUTER TECHNIQUES
Design of the software development and verification system [SWDVS] for shuttle NASA study task 35
[NASA-CR-140341] N75-12038
A computerized system for reliability predictions: RRP-1. Part 1: Introduction
[FTL-A-A16:23-PT-1] N75-12344
Interactive digital image processing and display system
[UCRL-75655] N75-12646
A review of picture processing by computer
[FOA-2-C-2583-E1] N75-12656
Barely intelligent terminal
[LBL-2676] N75-12661
Analysis of ballistic calibration data and government/contractor CEP test data with respect to the AN/TPQ-27 contract incentive fee determination
[AD-781373] N75-12709
Nord data 72 at Helsinki, June 1972
[FOA-1-C-1496-M4] N75-12849
Optimal concepts of fire protection as a function of the importance of data processing installations
[LA-TR-74-20] N75-12850

COMPUTERIZED DESIGN
Interactive computer-aided design aircraft flying qualities program. Volume 1: Users manual
[AD-785101] N75-11957
Interactive computer-aided design aircraft flying qualities program. Volume 2: Methods formulation manual
[AD-785102] N75-11958
Interactive computer-aided design aircraft flying qualities program. Volume 3: Computer programming manual
[AD-785103] N75-11959
Interactive computer-aided design aircraft flying qualities program. Volume 4: Program assessment/correlation report
[AD-785104] N75-11960

COMPUTERIZED SIMULATION
Skylab mission planning support through the use of a hybrid simulation
[NASA-TM-X-64889] N75-12037
The Mark 4 supersonic-hypersonic arbitrary body program. Volume 3: Program listings
[AD-778445] N75-12057
SAR image quality analysis model, volume 2
[AD-785398] N75-12187
High power ac/dc variable R dynamic electrical load simulator
[NASA-CR-140331] N75-12199
Optimum response simulation of multidegree systems by pulse excitation --- by use of a computer algorithm
[AD-783226] N75-12382
Systems simulation: A global approach to aircrew workload --- computerized systems analysis N75-12588
Computer simulation of the threshold sensitivity determinations
[NASA-TN-D-7663] N75-12690
LYSTER: Air defence surface protection capability in Swedish terrain
[FOA-P-C-8349-M1] N75-12890

COMPUTERS
Fire protection in electronic installations
[LA-TR-74-17] N75-12165
Installation of R-20 computer described N75-12831

CONCENTRATORS
Thermostatically controlled nontracking type solar energy concentrator
[NASA-CASE-NPO-13497-1] N75-12429

CONCRETES
Skidproof dyes for concrete and asphalt
[FOA-2-C-2592-E6] N75-12333

CONDENSATION
Cluster intensity and velocity measurements in condensed flows
[AD-785348] N75-12264

CONFERENCES
Proceedings of Quarterly Meeting of Life Cycle cost task group of the joint services data exchange for inertial systems
[AD-785390] N75-11915
Short course on STOL aircraft technology and the community, volume 1 N75-11938
Simulation and study of high workload operations -- - psychophysiological effects on air crews
[AGARD-CP-146] N75-12587
New or newly tested methods for the assessment of pilots' workload --- conference
[DLR-MITT-74-19] N75-12605
A compilation of papers presented at the On-Axis Software Conference
[AD-785218] N75-12649
Proceedings of the Canadian Workshop on acoustic surface waves
[CRC-1260] N75-12696
Magnetofluiddynamics --- conference
[DLR-MITT-74-20] N75-12779
Radioactive shipments through our states: The weakest link? --- conference
[CONF-730588] N75-12860

CONGRESSIONAL REPORTS
Aircraft noise abatement
[GPO-41-298] N75-11969
Earth resources survey system
[GPO-41-665] N75-12416
Solar sea thermal energy
[GPO-37-476] N75-12430
Energy and environmental standards --- environmental standards and energy policy
[GPO-37-171] N75-12431
Automobile emission standards
[S-REPT-93-598] N75-12452

CONICAL BODIES
Fabrication of a conical composite stiffening rib --- for reentry vehicles
[SLA-74-277] N75-12370

CONICAL INLETS
Distortion in a full-scale bicone inlet with internal focused compression and 45 percent internal contraction
[NASA-TM-X-3133] N75-11970

CONSTITUTIVE EQUATIONS
Dynamic constitutive equations --- involving stress wave propagation through solid materials
[SLA-74-5438] N75-12682

CONTAMINATION
Determination of points of entry for potential contaminants into limestone aquifers using thermal infrared imagery
[NASA-CR-120540] N75-12546
Profile and contamination of an electron beam --- measured with nitrocellulose sheets
[NP-20054] N75-12720

CONTINENTAL SHELVES
The influence of surface waves on water circulation in a mid-Atlantic continental shelf region
[NASA-TN-D-7771] N75-12537
New England Continental Shelf dynamics pilot experiment
[AD-785257] N75-12542

CONTINENTS
Continental hydrology. Terms and definitions. GOST 19179-73 N75-12526

CONTINUUM FLOW
Effects of wing/elevon gap sealing flapper doors on orbiter elevon effectiveness of model 16-0 in the NAAL 7.75 by 11 foot continuous flow wind tunnel [OA119A]
[NASA-CR-134421] N75-12035
Osmosis and ion transport in charged porous membranes: A macroscopic, mechanistic model --- analysis of continuum flow in charged, macroscopic pores through a charged membrane
[PUBL-74-6] N75-12242

CONTRACT MANAGEMENT
An exploration into the practices of DCAS industrial specialists in obtaining contractor production information on high priority, medium value contracts
[AD-785441] N75-12854

CONTROL BOARDS
Psychophysiological stress investigations of an instrument-coordination analyzer N75-12607
Measurement and estimation procedure for flight safety control operator workload N75-12609

CONTROL EQUIPMENT
Command electronics of the inertia wheel N75-12052
Some analogue control techniques in applied fluidics
[FOA-2-C-2576-E4] N75-12241

CONTROL SIMULATION
A simulator study to investigate human operator workload N75-12589
Description of some experimental methods with adaptive planning
[FOA-P-C-8339-M3] N75-12853

CONTROL STABILITY
Research study on stabilization and control modern sampled-data control theory. Design of the Large Space Telescope system
[NASA-CR-120534] N75-12669

CONTROL STICKS
Control authority with a flight performance controller --- development of aircraft system for pilot control of aircraft bank angle and vertical speed
[AD-784889] N75-11953

CONTROL THEORY
Modular asynchronous control design --- for control logic
[TID-26601] N75-12670
Mathematical modelling and identification theory
[AD-785425] N75-12687

CONVECTION
Numerical and experimental studies of the natural convection within a horizontal cylinder
[NASA-TN-D-7728] N75-12244

COOLING
Cryogenic coolers for space systems --- including open and closed cycle systems
[AD-785083] N75-12267

COOLING SYSTEMS
Liquid metal cooling of turbine blades
[RAE-LIB-TRANS-1713] N75-11977

COPPER
Surface recrystallization theory of the wear of copper in liquid methane
[NASA-TN-D-7840] N75-12124
Structure and mechanical properties of Cu-Mn-Al alloy
[LBL-2598] N75-12133
Application of eddy currents to detect corrosion in copper and stainless steel tubing
[K-1860] N75-12134

CORE FLOW
Investigation of viscous line vortices with and without the injection of core turbulence
[AD-785256] N75-12261

CORRELATION
Transition probabilities, correlation functions and dielectric permittivity tensors for semibounded and bounded nonequilibrium plasma
[ITF-74-21E] N75-12800

CORRELATORS
Nonlinear effects: Amplifiers and convolvers N75-12702

CORROSION
Fifth International Congress on Metal Corrosion
[FOA-1-C-1493-G3[G1]] N75-12129
Application of eddy currents to detect corrosion in copper and stainless steel tubing
[K-1860] N75-12134

CORROSION PREVENTION
Cleaning and corrosion control of avionics equipment at all levels of maintenance
[AD-784975] N75-11968

COSMIC PLASMA
Interactions of fast particles with waves of cosmic magnetoactive plasma
[NP-20009] N75-12792

COSMIC RAYS
Determination of the efficiency and angular directivity of cosmic gamma ray detectors N75-12281
Estimates of radiation exposure from solar cosmic rays in SST altitudes
[NASA-TM-X-71990] N75-12883
Cosmic gamma-ray bursts: A review of the observational data
[LA-UR-74-833] N75-12888

COST ANALYSIS
The airline minimum fleet problem --- development of algorithms for optimization of airline operations
[AERO-TN-7403] N75-11909
An advanced air traffic management concept based on extensions of the upgraded third generation ATC system. System B: System cost analysis
[AD-785313] N75-11924

COST EFFECTIVENESS
Duration of program for program optimization
[FOA-P-C-8350-M3[E5]] N75-12655

COSTS
Proceedings of Quarterly Meeting of Life Cycle cost task group of the joint services data exchange for inertial systems
[AD-785390] N75-11915

COULOMB COLLISIONS
Approximate Fokker-Planck operators for Coulomb collisions
[ORNL-TM-4605] N75-12815

COULOMETRY
Determination of mercury by controlled potential coulometry: An outlay for automatic performance
[EUR-5125] N75-12103

COUNTERS
Balloon-borne aerosol counter modifications, particle sizing accuracy tests
[AD-784866] N75-12475

COUPLED MODES
Calculation of the flapwise bending, edgewise bending, and torsional vibrations of rotor blades with coupled natural modes and frequencies
[NASA-TT-F-16004] N75-11892

COUPLING COEFFICIENTS
An experimental study of coupling effects in a planar array antenna --- reflection factor calculation
[FOA-3-C-3728-E2] N75-12704

CRACK INITIATION
Experimental measurement of in situ stress in granite by hydraulic fracturing
[LA-5605-MS] N75-12388

CRACK PROPAGATION
Prevention and control of subcritical crack growth in high-strength metals
[AD-785233] N75-12135
Observations on the stress corrosion cracking of an Al-5 percent Zn-2.5 percent Mg ternary and various quarternary alloys
[AD-785020] N75-12142
Effect of loading rate on crack growth in glass-epoxy sheet
[AD-785519] N75-12149
Slow and fast motion of cracks in inelastic solids. Part 1: Slow growth of cracks in a rate sensitive tresca solid. Part 2: Dynamic crack represented by the Dugdale model
[NASA-CR-140803] N75-12354
Fatigue crack propagation due to random amplitude vibrations: Prediction using constant amplitude data
[RD/B/N-2784] N75-12368
Load and environment interactions in fatigue crack growth
[AD-785249] N75-12374
Weakening of an elastic solid by a rectangular array of cracks
[AD-785436] N75-12379

CRACKING [FRACTURING]
Alternating method applied to edge and surface crack problems
[NASA-CR-140846] N75-12353
Experimental measurement of in situ stress in granite by hydraulic fracturing
[LA-5605-MS] N75-12388

CREEP PROPERTIES
Properties of thick type 308 stainless steel welds with controlled residual elements
[ORNL-TM-4206] N75-12369

CROPS
The value of improved [ERS] information based on domestic distribution effects of U.S. agriculture crops
[NASA-CR-141046] N75-12423

CRUDE OIL
Oil for the free world in the 1970's --- demand and supply
[AD-779352] N75-12448

CRYOGENIC EQUIPMENT
Investigation of the heat exchange in demountable connections of cryogenic systems
N75-12239

CRYOGENICS
The cryogenic wind tunnel concept for high Reynolds number testing
[NASA-TN-D-7762] N75-12000
Simulation of flight test conditions in the Langley pilot transonic cryogenic tunnel
[NASA-TN-D-7811] N75-12001
Tough cryogenic alloys from the Fe-Mn and Fe-Mn-Cr systems
[NASA-CR-134688] N75-12120
Conductor tests for dc superconducting power transmission --- cryogenic and electrical properties
[LA-UR-74-724] N75-12213
Cryogenic coolers for space systems --- including open and closed cycle systems
[AD-785083] N75-12267

CRYSTAL DEFECTS
X-ray topographic study of crystal defects produced by diffusion of additive elements in single germanium crystals
N75-12089
Annealing of stacking-fault tetrahedra and frank dislocation loops in silver
[LBL-1172] N75-12132
Structural analysis on silicon after implantation of carbon ions in the energy region of 1 to 3 MeV
N75-12146
Non-conventional electron microscopy in small defect characterization
[LBL-2585] N75-12766

CRYSTAL DISLOCATIONS
Annealing of stacking-fault tetrahedra and frank dislocation loops in silver
[LBL-1172] N75-12132

CRYSTAL STRUCTURE
A three-dimensional structure model for a high modulus pan-based carbon fiber
[AD-784415] N75-12085
Type 2 film superconductors for power applications
[AD-785534] N75-12220
Determination of contained functions in the modified-plane-wave method of band structure calculation
[AD-785515] N75-12823

CRYSTALLOGRAPHY
High resolution imaging in bright and dark field at high voltages
[LBL-2712] N75-12765
Non-conventional electron microscopy in small defect characterization
[LBL-2585] N75-12766

CRYSTALS
Instrument for measuring the concentration of crystalline particles
N75-12503

CULTURE TECHNIQUES
Investigation of the dynamics of accumulation of trace elements by chlorella cells during prolonged cultivation
N75-12560

CUMULUS CLOUDS
Statistical characteristics of the vertical moisture profile in the case of cumulus clouds
N75-12495

CURIUM 244
ORNL isotopic power fuels --- emphasizing [Cm-244]2O3
[ORNL-4978] N75-12730

CURVED BEAMS
Linear stabilization theory for curved rods
N75-12356

CURVES [GEOMETRY]
Method of measuring areas by a curvometer --- hydrographic areas from topographic maps
N75-12504
Simplified method of measuring the length of highly sinuous rivers
N75-12505

CUSHIONCRAFT GROUND EFFECT MACHINE
Air cushion landing systems for aircraft --- short takeoff aircraft
N75-11944
Development and applications of the air cushion landing system --- to reduce ground pressure in conditions of poor soil strength
N75-11952

CYANATES
The semimicro determination of potassium chlorate and lead thiocyanate in priming compositions
[DSL-TN-339] N75-12093

CYBERNETICS
Cybernetic methods in diagnostics --- using mathematical models
N75-12668

CYGNUS CONSTELLATION
What is special about Cygnus X-1? --- evidence for a black hole
[NASA-TM-X-70791] N75-12862

CYLINDERS
Study of the turbulent torque flow in a cylindrical model apparatus
N75-12232
Calculation of bearing loads and displacement paths in fast running high performance diesel engines at different point loads with emphasis on speed drop
N75-12332

CYLINDRICAL BODIES
Application of wave mechanics theory to fluid dynamics problems: Boundary layer on a circular cylinder including turbulence
[NASA-CR-140849] N75-12230
Numerical and experimental studies of the natural convection within a horizontal cylinder
[NASA-TN-D-7728] N75-12244
Effect of shock impingement on heat transfer. Part 2: Effect of shear layer impingement on pressure and heat transfer rate distribution around a cylinder
[AD-778962] N75-12269

CYLINDRICAL SHELLS
Proposed method and device for obtaining piezoelectric constants of ceramic cylindrical shells
[AD-785008] N75-12150
Stress analysis of a radial nozzle attached to a cylindrical shell under internal pressure
[ORNL-TM-4269] N75-12366
Comparison of the results of the dynamic response of cylindrical shells by finite element methods: Axisymmetric case
[AD-785258] N75-12381

D

DAMPING
Aerodynamic roll damping of a T-tail transport configuration
[NASA-TM-X-3115] N75-11898
Principle of systems with Foucault current dissipation --- magnetic bearings damping
N75-12050

DAMPING TESTS
Foucault current damping tests
N75-12047

DAMS
Observations on blast explosions at Medeo, USSR, 1966
[FOA-4-C-4523-A1] N75-12156

DATA ACQUISITION
Digital data collection with A/D-transducer DEC AF01, tape player AMPEX FR1300 and computer pdp-8/1
[FOA-1-C-1497-D1] N75-12288
On-line data acquisition and data processing in a meteorological tower-PDP-8/1-CALAS system coupling
[KFK-1934] N75-12532
A system of computer programs for recording the activity of mice
[FOA-1-C-1478-M4] N75-12545
Combined use of Tiros and DETEF systems for programming, data collection and evaluation of data output
[FOA-1-C-1474-C4] N75-12653
Information theory aspects of long range analyses
[FOA-2-C-2568-E1] N75-12848

DATA BASES
A discretized program for the optimal design of complex structures
N75-12362
Coordination of critical access to distributed databanks in computer networks based on decentralized control
[KFK-1967] N75-12663

DATA CONVERSION ROUTINES
Combined use of Tiros and DETEF systems for programming, data collection and evaluation of data output
[FOA-1-C-1474-C4] N75-12653

DATA CONVERTERS
Digital data collection with A/D-transducer DEC AF01, tape player AMPEX FR1300 and computer pdp-8/1
[FOA-1-C-1497-D1] N75-12288

DATA LINKS
Experiment with laser communication
[FOA-2-C-2575-E2] N75-12298
Multi-computer multiple data path hardware exchange system
[NASA-CASE-NPO-13422-1] N75-12652
NCAR telemetry and command system --- development of system for recovering and reproducing data from balloon-borne experiments
N75-12761
Airoscope telemetry system --- development of data link from balloon gondola to ground station
N75-12762
Airoscope command system --- pulse code modulation telemetry command system for data link with balloons
N75-12763

DATA PROCESSING
Correlation and registration of ERTS multispectral imagery --- by a digital processing technique
[NASA-CR-134294] N75-12420
Computer treatment of climatic research data: Table type A
[FOA-1-C-1503-M4[H5-H6]] N75-12530
On-line data acquisition and data processing in a meteorological tower-PDP-8/1-CALAS system coupling
[KFK-1934] N75-12532
Visual information processing of complex imagery
[AD-785366] N75-12612
Human information processing: An assessment and research battery
[AD-785411] N75-12613
Department of defense space shuttle on-board software requirements
[AD-785123] N75-12648
A compilation of papers presented at the On-Axis Software Conference
[AD-785218] N75-12649
Study of multiple time series by data analysis
[CEA-R-4561] N75-12679
Nord data 72 at Helsinki, June 1972
[FOA-1-C-1496-M4] N75-12849
Optimal concepts of fire protection as a function of the importance of data processing installations
[LA-TR-74-20] N75-12850
Data acquisition and processing system for ultrasonic research
[AD-785127] N75-12852

DATA PROCESSING EQUIPMENT
Omega flight-test data reduction sequence --- computer programs for reduction of navigation data
[NASA-CR-140827] N75-11911
Design of the software development and verification system [SWDVS] for shuttle NASA study task 35
[NASA-CR-140341] N75-12038

DATA PROCESSING TERMINALS
Barely intelligent terminal
[LBL-2676] N75-12661
Interface message processors for the ARPA computer network
[AD-784951] N75-12665

DATA RECORDERS
Aircraft accident medical investigator's kit
[AD-785389] N75-12583
NCAR telemetry and command system --- development of system for recovering and reproducing data from balloon-borne experiments
N75-12761

DATA REDUCTION
Reduction and error analysis of the AVE 2 pilot experiment data
[NASA-CR-120496] N75-12531

Application software for electron microprobe analysis and data reduction
[SLL-74-5] N75-12642

DATA RETRIEVAL
Image selection system --- computerized data storage and retrieval system
[NASA-CR-2475] N75-12422
Computer treatment of climatic research data: Table type A
[FOA-1-C-1503-M4[H5-H6]] N75-12530

DATA SAMPLING
Study of multiple time series by data analysis
[CEA-R-4561] N75-12679

DATA STORAGE
Information storage in photodichroic crystals
[AD-785005] N75-12109
Image selection system --- computerized data storage and retrieval system
[NASA-CR-2475] N75-12422
LECO: A compacting and editing program
[FOA-P-C-8353-M3[E5]] N75-12634

DATA SYSTEMS
Earth resources sensor data handling system: NASA JSC version
[NASA-CR-140334] N75-12418

DATA TRANSMISSION
The effect of protocol on the response time of loop structures for data communications
[CRC-1261] N75-12174
Design of a secure data transmission system: An implementation of communication theory using a microcomputer
[UCRL-51587] N75-12625

DAYTIME
Time dependence of the flight induced increase of free urinary cortisol secretion in jet pilots N75-12597

DECISION MAKING
Future scientific research: The elites new Latin or a new name for some old ways of thinking
[FOA-P-C-8347-M5] N75-11981
Man as a precious resource: The enhancement of human effectiveness in air transport operations
[AD-785368] N75-12620
Generalization of domination structures and nondominated solutions in multicriteria decision making
[AD-784418] N75-12845

DEFINITION
Continental hydrology. Terms and definitions. GOST 19179-73 N75-12526

DEFLECTION
A wind tunnel investigation of the wake near the trailing edge of a deflected externally blown flap --- on a jet powered STOL transport aircraft
[NASA-TM-X-3079] N75-11896
Dynamic molecular deflection
[AD-785407] N75-12718

DEGREES OF FREEDOM
A motion-constraint logic for moving-base simulators based on variable filter parameters
[NASA-TN-D-7777] N75-11933

DELAWARE
Definition of heavy industry, guidelines for acceptable manufacturing uses, and plan for manufacturing gases in Delaware's coastal zone N75-12855
Public land use controls in Delaware's coastal zone N75-12856

DELTA WINGS
Application of the nonlinear theory of a listing surface to the calculation of aerodynamic characteristics of a triangular wing moving close to the earth's surface
[AD-785154] N75-11901

DEMAND [ECONOMICS]
A look at the future of electronic components
[FTL-A-A28:1] N75-12210
Oil for the free world in the 1970's --- demand and supply
[AD-779352] N75-12448

DENMARK
Oceanographical observations from Danish lightvessels and coastal stations, 1973
[ISBN-87-7478-097-2] N75-12539

DENSE PLASMAS
Problems in the generation of extremely dense plasmas by means of electric wire explosions N75-12781

DENSITOMETERS
Ultrasonic bone densitometer
[NASA-CASE-MFS-20994-1] N75-12271

DENSITY [MASS/VOLUME]
Density and compressibility studies on homologous rows of ethers, ketones, dioles up to 4000 bar and 80 C N75-12098
Comparison of the diagnostic and forecasting calculations of currents in the lower part of the Atlantic Ocean N75-12497

DENSITY MEASUREMENT
Determining particle density using known material Hugeniot curves
[NASA-CASE-LAR-11059-1] N75-12810

DEOXYRIBONUCLEIC ACID
Molecular basis for the mutagenic and lethal effects of ultraviolet irradiation
[COO-3232-3] N75-12548

DEPTH MEASUREMENT
Calculating the depth of the freezing of swamps of the flat bog type in the example of the Tarman bog N75-12522

DETONATION WAVES
Kamlets technique for predicting detonation velocity and pressure --- using semiempirical equations
[REPT-594] N75-12153
The influence of heat treatment on a magnetogasdynamic flow N75-12783

DEUTERIUM
Burn characteristics of marginal deuterium-tritium microspheres
[LA-5603-MS] N75-12729

DEUTERIUM COMPOUNDS
The nu sub 2 band CHD3; ground state parameters for CHD3 from combination differences
[NASA-CR-140861] N75-12088

DIAGNOSIS
Cybernetic methods in diagnostics --- using mathematical models N75-12668

DIALYSIS
Mathematical modeling of Donnan dialysis; a continuous ion exchange membrane process
[SRO-810-1] N75-12547

DIAPHRAGMS [MECHANICS]
Osmosis and ion transport in charged porous membranes: A macroscopic, mechanistic model --- analysis of continuum flow in charged, macroscopic pores through a charged membrane
[PUBL-74-6] N75-12242

DIELECTRICS
Analysis of strip antennas in the presence of a dielectric inhomogeneity
[NASA-CR-140854] N75-12201
Transverse propagation constants in dielectric waveguides
[AD-785512] N75-12712
Particle registration in dielectric materials: A bibliography
[UCRL-51568] N75-12726
Investigations of plasma dielectric functions --- analysis from electric network theory
[RISO-301] N75-12796

DIESEL ENGINES
Calculation of bearing loads and displacement paths in fast running high performance diesel engines at different point loads with emphasis on speed drop N75-12332

DIFFERENCE EQUATIONS
Creation and comparison of finite difference analogs of some finite element schemes
[LA-UR-74-771] N75-12685

DIFFERENTIAL EQUATIONS
Modified multistep methods for the numerical solution of a class of stiff ordinary differential equations
[FOA-2-C-2570-M4] N75-12677
Comparison of some codes for the initial value problem for ordinary differential equations
[SLA-74-5319] N75-12681

DIFFERENTIAL THERMAL ANALYSIS
High pressure differential thermal analysis experiments with the LaNi5-H system
[SLA-74-5322] N75-12101

DIGITAL COMPUTERS
Modular digital missile guidance system study
[AD-784969] N75-12054
Sizing of complex structure by the integration of several different optimal design algorithms
[L-9738] N75-12361

DIGITAL DATA
Developing processing techniques for Skylab data --- Michigan test site
[E75-10040] N75-12409

DIGITAL FILTERS
Limiting statistics of fixed-point multiplication errors in digital filters with coefficients of arbitrary word length
[AD-784982] N75-12185
Optimal design of recursive digital filters
[AD-785571] N75-12216

DIGITAL SYSTEMS
Field testing of a system for communication with commercial SNM shipments
[SLA-74-5431] N75-12181
Airoscope telemetry system --- development of data link from balloon gondola to ground station N75-12762

DIGITAL TECHNIQUES
Correlation and registration of ERTS multispectral imagery --- by a digital processing technique
[NASA-CR-134294] N75-12420
A system for input and output of digital pictures
[FOA-2-C-2573-E1] N75-12660

DIGITAL TRANSDUCERS
Digital data collection with A/D-transducer DEC AF01, tape player AMPEX FR1300 and computer pdp-8/1
[FOA-1-C-1497-D1] N75-12288
Interdigital transducers and acoustic-surface-wave filters N75-12698

DIPOLE ANTENNAS
Analysis of crossed wires in a plane-wave field --- induced electric currents and charges
[AD-784972] N75-12219

DIRECT CURRENT
Thyristor dc electric drive with time-proportional speed control N75-12834

DIRECTIONAL CONTROL
A wind-tunnel investigation of parameters affecting helicopter directional control at low speeds in ground effect
[NASA-TN-D-7694] N75-11931

DISASTERS
Remote sensing utility in a disaster struck urban environment
[NASA-CR-140801] N75-12858

DISCONTINUITY
Directional discontinuities from Mariner 5 and solar wind structure
[NASA-TM-X-70733] N75-12884

DISEASES
Vibration disease and its pathogenesis
[AD-785202] N75-12584

DISPERSIONS
Boundary layer aerosol transport measurements in a valley system
[AD-781010/4] N75-12477

DISPLAY DEVICES
Investigation of pilot's role and display requirements in automatic landings
[NASA-CR-140844] N75-12617
Interactive digital image processing and display system
[UCRL-75655] N75-12646
The AIROscope pointing and stabilization system N75-12758

DISTORTION
Some observations of the effects of radial distortions on performance of a transonic rotating blade row
[NASA-TN-D-7824] N75-12245

DISTRIBUTION FUNCTIONS
Sample size determination for estimating parameters of the exponential distribution
[AD-785503] N75-12351

DIURNAL VARIATIONS
Pilot landing performance under high workload conditions --- considering day and night proficiencies N75-12594

DOMAIN WALL
Transient and steady-state velocity of domain walls for a complete range of drive fields
[NASA-CR-140942] N75-12694

DOPPLER RADAR
Measurement of splinter retardation by means of Doppler radar, introductory points of view
[FOA-2-C-2567-D4] N75-11895

DOSIMETERS
Criteria for personal dosimetry in mixed radiation fields in space --- analyzing trapped protons, tissue disintegration stars, and neutrons
[NASA-CR-140365] N75-12574

DRAG
Drag force on objects in the nearly free molecular flow regime as a function of speed ratio
[AD-785351] N75-12265

DRAG MEASUREMENT
Measurement of splinter retardation by means of Doppler radar, introductory points of view
[FOA-2-C-2567-D4] N75-11895
Sweep effect on the drag of rows of perpendicular circular cylinders in a laminar boundary layer at supersonic free-stream velocities
[NASA-TN-D-7812] N75-12235

DRAG REDUCTION
An improved projectile boattail
[AD-785520] N75-11900

DRAINAGE
Application of expansions with respect to natural orthogonal components in the studies of drainage --- hydrometeorological factors during spring floods N75-12517

DRAINAGE PATTERNS
A Skylab program for the International Hydrological Decade [IHD] --- Lake Ontario Basin
[E75-10039] N75-12408

DRUGS
Automated analysis of oxidative metabolites
[NASA-CASE-ARC-10469-1] N75-12086

DRY HEAT
Environmental microbiology as related to planetary quarantine --- synergetic effect of heat and radiation
[NASA-CR-140941] N75-12622

DUST
Dust storms according to data of space research --- spaceborne photography of arid zones
[NASA-TT-F-16021] N75-12463

DUST COLLECTORS
Study of the turbulent torque flow in a cylindrical model apparatus
N75-12232
DYE LASERS
Dye testing and evaluation program
[AD-784885] N75-12313
DYES
Skidproof dyes for concrete and asphalt
[FOA-2-C-2592-E6] N75-12333
DYNAMIC CHARACTERISTICS
Theoretical study of system dynamics --- momentum wheel for satellite despinning
N75-12048
DYNAMIC RESPONSE
Comparison of the results of the dynamic response of cylindrical shells by finite element methods: Axisymmetric case
[AD-785258] N75-12381
DYNAMIC STRUCTURAL ANALYSIS
Dynamic constitutive equations --- involving stress wave propagation through solid materials
[SLA-74-5438] N75-12682

E

E REGION
The E region of this ionosphere at night time: A literature study
[FOA-3-C-3731-E1] N75-12472
EARTH ATMOSPHERE
Study of atmospheric effects in Skylab data
[E75-10006] N75-12391
Experimental evaluation of atmospheric effects on radiometric measurements using the EREP of Skylab --- Bonneville Salt Flats, Utah
[E75-10036] N75-12406
EARTH ORBITS
AAFE man-made noise experiment project. Volume 1: Introduction experiment definition and requirements
[NASA-CR-132509] N75-12168
AAFE man-made noise experiment project. Volume 2: Project and experiment discussions
[NASA-CR-132510] N75-12169
AAFE man-made noise experiment project. Volume 3: Appendices
[NASA-CR-132511] N75-12170
EARTH RESOURCES
Feasibility study ASCS remote sensing/compliance determination system
[NASA-CR-134288] N75-12419
EARTH RESOURCES PROGRAM
New theoretical models and ratio imaging techniques associated with the NASA earth resources spectral information system
[NASA-CR-140357] N75-12417
Earth resources sensor data handling system: NASA JSC version
[NASA-CR-140334] N75-12418
EARTH RESOURCES SURVEY PROGRAM
Earth resources survey system
[GPO-41-665] N75-12416
EARTH RESOURCES TECHNOLOGY SATELLITE 1
Correlation and registration of ERTS multispectral imagery --- by a digital processing technique
[NASA-CR-134294] N75-12420
A study of Minnesota forests and lakes using data from Earth Resources Technology Satellites
[NASA-CR-140865] N75-12421
EARTH RESOURCES TECHNOLOGY SATELLITES
Improved [ERTS] information and its impact on U.S. markets for agricultural commodities: A quantitative economic investigation of production, distribution and net export effects
[NASA-CR-141044] N75-12424
The role of ERTS in the establishment and of a nationwide land cover information system
[NASA-CR-141045] N75-12425
EARTHQUAKES
Seismic magnitudes from explosions and earthquakes obtained at the Hagfors and Matsushiro Observatories
[FOA-C-20010-T1] N75-12465
Seismic forerunners of destruction
[JPRS-63441] N75-12468
ECOLOGY
An interdisciplinary analysis of multispectral satellite data for selected cover types in the Colorado Mountains, using automatic data processing techniques --- hydrology, ecology, geology, vegetation, and mineral deposits
[E75-10002] N75-12390
ECONOMIC ANALYSIS
The value of improved [ERS] information based on domestic distribution effects of U.S. agriculture crops
[NASA-CR-141046] N75-12423
ECONOMIC FACTORS
The airline minimum fleet problem --- development of algorithms for optimization of airline operations
[AERO-TN-7403] N75-11909
Future climate --- effects of modern economic activity
N75-12508
EDDY CURRENTS
Momentum wheel - magnetic suspension losses by Eddy currents --- for samarium cobalt magnets
N75-12042
Application of eddy currents to detect corrosion in copper and stainless steel tubing
[K-1860] N75-12134
EDGES
Detectability of an unsharp edge in additive noisy background
[FOA-2-C-2591-E1-H5] N75-12577
EDUCATION
Variability in reaction response --- human response accuracy as function of training and fatigue
[FOA-2-C-2581-H5] N75-12586
EFFECTIVE PERCEIVED NOISE LEVELS
Investigations into aircraft noise reduction by shielding --- europlane QTOL design concept
N75-11949
Acoustic attenuation design requirements established through EPNL parametric trades
[NASA-CR-120986] N75-11985
ELASTIC BUCKLING
Shear buckling of square perforated plates
[NASA-CR-132548] N75-12364
ELASTIC PROPERTIES
Slow and fast motion of cracks in inelastic solids. Part 1: Slow growth of cracks in a rate sensitive tresca solid. Part 2: Dynamic crack represented by the Dugdale model
[NASA-CR-140803] N75-12354
Thin-walled beam theory generalized to include thermal effects and arbitrary twist angle
[CRC-1253] N75-12363
Seminar on load calculations
[REPT-72-6] N75-12372
Weakening of an elastic solid by a rectangular array of cracks
[AD-785436] N75-12379
Collaborative research in cardiovascular dynamics and bone elasticity
[NASA-CR-140997] N75-12572
ELASTIC SHELLS
Dynamics of elastic shells containing acoustic medium with sources
[AD-785193] N75-12380
ELASTIC SYSTEMS
Vibration energy density spectra in response domain for viscous damped elastic systems with sinusoidal and broadband random excitation
[AD-784974] N75-12383
ELECTRIC ARCS
The radial free flight arc
N75-12788
ELECTRIC BATTERIES
Development of a battery status monitor
[NASA-CR-140362] N75-12278
ELECTRIC CHARGE
Analysis of crossed wires in a plane-wave field --- induced electric currents and charges
[AD-784972] N75-12219
ELECTRIC COILS
Theoretical investigations on the coaxial accelerator with compression coil --- for the simulation of micrometeorides
N75-12782
ELECTRIC CONTROL
Control of a transistor switch by current transformer
[RAE-LIB-TRANS-1774] N75-12196
ELECTRIC CURRENT
Foucault current damping tests
N75-12047
Principle of systems with Foucault current dissipation --- magnetic bearings damping
N75-12050
Analysis of crossed wires in a plane-wave field --- induced electric currents and charges
[AD-784972] N75-12219
QUICKE2: A one-dimensional code for calculating bulk and vacuum emitted photocompton currents
[SLL-74-218] N75-12817
ELECTRIC DISCHARGES
On producing a CO2-laser medium for high output with an electric discharge in a supersonic flow
N75-12791
ELECTRIC ENERGY STORAGE
DCTR power supply and energy storage review meeting
[WASH-1310] N75-12445
ELECTRIC EQUIPMENT
U. S. Army helicopter electrical system reliability and maintainability investigation. Volume 1: Document deficiency analysis
[AD-785573] N75-11961
U. S. Army helicopter electrical system reliability and maintainability investigation. Volume 2: Supplemental design guide
[AD-785574] N75-11962
High power ac/dc variable R dynamic electrical load simulator
[NASA-CR-140331] N75-12199
ELECTRIC FIELDS
Dynamic of the current sheath in a pulsed coaxial injector
[AD-785115] N75-12809
ELECTRIC MOMENTS
Analysis of strip antennas in the presence of a dielectric inhomogeneity
[NASA-CR-140854] N75-12201
ELECTRIC POWER PLANTS
Electrojet power plants in space --- for satellite correction and orientation systems
N75-12065
Energy plantations: Should we grow trees for power plant fuel?
[VP-X-129] N75-12436
Energy storage for the electric power industry
[LA-UR-74-918] N75-12447
ELECTRIC POWER SUPPLIES
High power ac/dc variable R dynamic electrical load simulator
[NASA-CR-140331] N75-12199
Power supply for Helmholtz coils --- for use in spectrometer
[AREAEE-177] N75-12212
Automated testing in a high noise environment
[BDX-613-1138] N75-12348
Energy and the environment: Electric power
N75-12438
ELECTRIC PROPULSION
High voltage supplies for electric thrusters
[RAE-LIB-TRANS-1773] N75-12062
Power processor design considerations for a solar electric propulsion spacecraft
[NASA-CR-140842] N75-12064
ELECTRIC ROCKET ENGINES
High voltage supplies for electric thrusters
[RAE-LIB-TRANS-1773] N75-12062
ELECTRIC SWITCHES
Control of a transistor switch by current transformer
[RAE-LIB-TRANS-1774] N75-12196
ELECTRICAL ENGINEERING
Translations on Eastern Europe: Scientific affairs, no. 438 --- electronics and laser research in Poland
[JPRS-63447] N75-12836
ELECTRICAL INSULATION
Inhomogeneous oil spark paths at unipolar voltage load
N75-12197
ELECTRICAL MEASUREMENT
Inaccuracy in measurements and calibrations
[FOA-3-C-3734-E8] N75-12206
ELECTRICAL PROPERTIES
Conductor tests for dc superconducting power transmission --- cryogenic and electrical properties
[LA-UR-74-724] N75-12213
ELECTRICAL RESISTANCE
Inhomogeneous oil spark paths at unipolar voltage load
N75-12197
ELECTRO-OPTICAL EFFECT
Active circuits for integrated optics. Study of a transverse electro-optical effect modulator
[LCR-73-133/R/G.5] N75-12193
Self-focusing and optical-field-induced effects in liquids and liquid crystals
[LBL-2592] N75-12767
ELECTRO-OPTICS
Achievements and development prospects of optoelectronics
N75-12837
ELECTRODES
Differential capacitance study on the edge orientation of pyrolytic graphite and glassy carbon electrodes
[AD-785263] N75-12043
ELECTRODYNAMICS
Tests on axial velocity sensor --- electrodynamic principle
N75-12049
ELECTROLYTES
Electrolyte for hydrocarbon air fuel cells --- including propane oxidation
[AD-784236] N75-12451
ELECTROMAGNETIC FIELDS
Study of field-plasma interaction by transient techniques
[AD-785404] N75-12885
ELECTROMAGNETIC NOISE MEASUREMENT
AAFE man-made noise experiment project. Volume 1: Introduction experiment definition and requirements
[NASA-CR-132509] N75-12168
AAFE man-made noise experiment project. Volume 2: Project and experiment discussions
[NASA-CR-132510] N75-12169
AAFE man-made noise experiment project. Volume 3: Appendices
[NASA-CR-132511] N75-12170
ELECTROMAGNETIC PULSES
Experiments on conventional excess voltage transient protection as a protection against an EMP transient
[FOA-4-C-4526-A3] N75-12207
ELECTROMAGNETIC RADIATION
Refractive index measurements by adaptive techniques [RIMDAPT: Phases 1 and 1A] --- ray tracing
[AD-785080] N75-12188

ELECTROMAGNETIC SCATTERING
Evaluating the Helmholtz integral. Part 1: Basic theory h-- with closed form representation as line integral
[AD-785013] N75-12715
ELECTROMAGNETIC SURFACE WAVES
Proceedings of the Canadian Workshop on acoustic surface waves
[CRC-1260] N75-12696
Introduction to the proceedings of the Canadian workshop on acoustic surface waves
N75-12697
Interdigital transducers and acoustic-surface-wave filters
N75-12698
Fabrication technology and materials --- for surface acoustic wave devices
N75-12699
Systems applications and implementation 1: Communications --- employing surface acoustic wave devices
N75-12700
Systems applications and implementation 2: Radar -- employing surface acoustic wave devices
N75-12701
Optical probing of surface waves
N75-12703
ELECTROMAGNETIC WAVE TRANSMISSION
AAFE man-made noise experiment project. Volume 1: Introduction experiment definition and requirements
[NASA-CR-132509] N75-12168
An examination of whiteouts and transmission through ice fog in the visible and near infrared
[DREO-TN-74-18] N75-12467
ELECTROMAGNETISM
Electromagnetic fluctuations in the half-space of nonequilibrium plasma
[ITF-74-23P] N75-12799
ELECTROMECHANICAL DEVICES
A feasibility study of limb volume measuring systems
[NASA-CR-140330] N75-12580
ELECTRON BEAMS
Profile and contamination of an electron beam --- measured with nitrocellulose sheets
[NP-20054] N75-12720
Space charge limiting of bounded relativistic electron beams
[UCID-16527] N75-12725
Applicability of absorber-ratio methods to beam-plasma systems
[AD-785238] N75-12802
ELECTRON DENSITY (CONCENTRATION)
Study of field-plasma interaction by transient techniques
[AD-785404] N75-12805
ELECTRON ENERGY
Study of field-plasma interaction by transient techniques
[AD-785404] N75-12805
ELECTRON IRRADIATION
Mass and energy dependence of secondary electron emission from metals, studied for ions in 22 elements from lithium to lead
N75-12811
ELECTRON MICROSCOPES
A high resolution electron microscope study of the omega transformation in Zr-N 0b alloys
[AD-785267] N75-12137
Basic research in scanning electron microscopy. --- using field emission guns and Elmiskope 101
[BMFT-FB-T-74-09] N75-12289
Application of Auger electron spectroscopy to electron probe microanalysis
N75-12290
On the scanning electron microscopy of thin specimens in transmission
N75-12291
Method of forming aperture plate for electron microscope
[NASA-CASE-ARC-10448-2] N75-12732
Non-conventional electron microscopy in small defect characterization
[LBL-2585] N75-12766
ELECTRON PRECIPITATION
Features of polar cusp electron precipitation associated with a large magnetic storm
[NASA-TM-X-70792] N75-12873
ELECTRON PROBES
A wavelength sorting method for electron probe X-ray microanalysis
[DSL-600] N75-12097
Application software for electron microprobe analysis and data reduction
[SLL-74-3] N75-12642
ELECTRON TUNNELING
AC electronic tunneling at optical frequencies
[NASA-CR-140802] N75-12812
ELECTRONIC CONTROL
Control unit for the control system of a rocket with liquid type engine
[FOA-1-C-1471-D3] N75-12068
Fire protection in electronic installations
[LA-TR-74-17] N75-12165
Electronic equipment, systems, and techniques: A compilation
[NASA-SP-5972[01]] N75-12200
ELECTRONIC EQUIPMENT
Low cost omega navigation receiver
[NASA-CR-140853] N75-11912
Command electronics of the inertia wheel
N75-12052
Electronic equipment, systems, and techniques: A compilation
[NASA-SP-5972[01]] N75-12200
A look at the future of electronic components
[FTL-A-A28:1] N75-12210
A computerized system for reliability predictions: RRP-1. Part 1: Introduction
[FTL-A-A16:23-PT-1] N75-12344
Computer generated troubleshooting trees: The program
[AD-785139] N75-12350
ELECTRONIC EQUIPMENT TESTS
Signal conditioner test set
[NASA-CASE-KSC-10750-1] N75-12270
ELECTRONIC MODULES
Automated testing in a high noise environment
[BDX-613-1138] N75-12348
ELECTRONIC RECORDING SYSTEMS
Apparatus for the automatic recorded weighing of fragments
[FOA-2-A-2568-D4] N75-12286
ELECTROSTATIC CHARGE
A model for the electrostatic charging process in fuel filtration
[PUBL-74-4] N75-12205
ELECTROSTATIC PRECIPITATORS
A study of literature on methods to determine the effect on visibility of the atmospheric particle concentration, size and distribution --- recording and collection of aerosols
[FOA-2-C-2606-E1] N75-12471
ELEMENTARY PARTICLES
Particle registration in dielectric materials: A bibliography
[UCRL-51568] N75-12726
ELEVONS
Effects of wing/elevon gap sealing flapper doors on orbiter elevon effectiveness of model 16-0 in the NAAL 7.75 by 11 foot continuous flow wind tunnel (OA119A)
[NASA-CR-134421] N75-12035
ENDOCRINE SECRETIONS
Endocrine-metabolic indices of aircrew workload: An analysis across studies
N75-12596
ENERGY CONSERVATION
Residential energy conservation
[TID-26534] N75-12442
ENERGY CONSUMPTION
The approaching energy crisis: A call for action
N75-12432
Energy and the environment in Baden-Wuerttemberg
[KFK-1966-UF] N75-12439
Residential energy conservation
[TID-26534] N75-12442
Energy consumption by industries in support of national defense: An energy demand model
[AD-784964] N75-12449
ENERGY CONVERSION
Is MHD dead? --- in terms of its uses in energy conversion and combustion technology
N75-12780
MHD energy conversion
[AD-785419] N75-12807
ENERGY DISSIPATION
Principle of systems with Foucault current dissipation --- magnetic bearings damping
N75-12050
ENERGY DISTRIBUTION
Energy distributions of ions from a pulsed vacuum arc
[SLA-74-5034] N75-12795
ENERGY POLICY
Project Independence: A summary
N75-12427
Project Independence
N75-12428
Solar sea thermal energy
[GPO-37-476] N75-12430
Energy and environmental standards --- environmental standards and energy policy
[GPO-37-171] N75-12431
The approaching energy crisis: A call for action
N75-12432
Coal conversion and usage: A systems study
[NASA-TM-X-58157] N75-12434
A survey of LNG technological needs in the USA: 1974 to beyond 2000
N75-12435
Energy plantations: Should we grow trees for power plant fuel?
[VP-X-129] N75-12436
Energy and the environment: Electric power
N75-12438
Energy and security: Implications for American policy
[AD-785084] N75-12857
ENERGY REQUIREMENTS
DCTR power supply and energy storage review meeting
[WASH-1310] N75-12445
Power requirements for magneto-optic modulation devices, a theoretical study
[AD-784977] N75-12772
ENERGY SOURCES
Solar sea thermal energy
[GPO-37-476] N75-12430
Oil for the free world in the 1970's --- demand and supply
[AD-779352] N75-12448
ENERGY STORAGE
Energy storage for the electric power industry
[LA-UR-74-918] N75-12447
Superconducting magnetic energy storage --- theta pinch thermonuclear fusion test reactor
[LA-UR-74-737] N75-12814
ENERGY TECHNOLOGY
Our prodigal sun --- solar energy technology
[NASA-EP-118] N75-12885
ENERGY TRANSFER
Automated testing in a high noise environment
[BDX-613-1138] N75-12348
Evapotranspiration: Agrometeorological aspect and evaluation of potential evapotranspiration
[MONO-65] N75-12482
ENGINE CONTROL
Investigation of the starting transients of high performance solid-propellant motors
[NASA-CR-140800] N75-12060
ENGINE DESIGN
Engines for commercial STOL transports --- high bypass turbofan
N75-11947
Acoustic attenuation design requirements established through EPNL parametric trades
[NASA-CR-120986] N75-11985
ENGINE INLETS
Turbine gas temperature measurement and control system
[NASA-CR-140971] N75-11987
ENGINE NOISE
Europlane QTOL: A European project proposal
N75-11941
Investigations into aircraft noise reduction by shielding --- europlane QTOL design concept
N75-11949
Some results of aeroacoustic research --- effect of shrouded nozzle configurations on jet noise
N75-11950
Fundamental and applied research on core engine/combustion noise of aircraft engines
[NASA-CR-140860] N75-11974
Small turbine engine noise reduction. Volume 5: Data tabulations
[AD-780576/5] N75-11988
Combustion generated noise in turbopropulsion systems
[AD-785485] N75-11990
ENGINE PARTS
Multiple fault gas path analysis applied to TF30-P-408 engine data
[AD-785265] N75-11996
ENGINE TESTS
A 727/JT8D-100 series engine exhaust system propulsion performance model test
[NASA-CR-134617] N75-11984
ENGINEERING
Engineering design handbook: Environmental series. Part one: Basic environmental concepts
[AD-784999] N75-12461
ENGINES
A spectrum truncation and damage tolerance study associated with the C-5A outboard pylon aft truss lugs
[AD-785196] N75-11935
ENGLISH CHANNEL
Climatological elements of the coasts of Metropolitan France [North Sea, Channel] --- wind, sea state, visibility, temperature
[MONO-93-VOL-1] N75-12485
ENGLISH LANGUAGE
Natural communication with Computers 4
[AD-784231] N75-12667
ENVIRONMENT EFFECTS
Process environment effects on heat pipes for fluidbed gasification of coal
[LA-UR-74-984] N75-12252
Applicability of Skylab remote sensing for detection and monitoring of surface mining activities --- strip mining and reclamation in Kentucky and Tennessee
[E75-10038] N75-12407
Energy and the environment: Electric power
N75-12438
Energy and the environment in Baden-Wuerttemberg
[KFK-1966-UF] N75-12439
Results of induced atmosphere measurements from the Apollo program --- possible effects of the induced environment in the vicinity of manned spacecraft on future manned laboratory experiments
[NASA-TN-D-7854] N75-12875
ENVIRONMENT PROTECTION
Peaceful nuclear explosions and the environment
[JPRS-63502] N75-12719

ENVIRONMENTAL MONITORING
A study of Minnesota forests and lakes using data from Earth Resources Technology Satellites
[NASA-CR-140865] N75-12421
ENVIRONMENTAL QUALITY
Energy and environmental standards --- environmental standards and energy policy
[GPO-37-171] N75-12431
ENVIRONMENTAL TESTS
Chemical and physical testing of thermal insulation materials for use at FFTF and SPTF
[LMEC-74-6] N75-12100
Sample test reports for camera, still picture, KA-91B --- performance tests of camera for aerial reconnaissance
[AD-785399] N75-12294
Multishot thermal battery --- power source for radio equipment
[AD-785584] N75-12450
ENVIRONMENTS
Engineering design handbook: Environmental series. Part one: Basic environmental concepts
[AD-784999] N75-12461
ENZYME ACTIVITY
Activity of blood enzymes in rabbits exposed to high-mountain hypoxia
N75-12559
EPITAXY
The deposition of Er-Eu-Ga-F c0e garnet single crystal films
[AD-785511] N75-12111
Active circuits for integrated optics. Study of a transverse electro-optical effect modulator
[LCR-73-133/R/G.5] N75-12193
EQUATIONS OF MOTION
Application of linearized transonic theory to tunnel blockage interference --- calculated with equations of motion
[AD-785349] N75-12008
A numerical method for the solution of particulate flow equations --- within two dimensional flow
[REPT-74-42] N75-12227
EQUATORS
Structure and migration of the equatorial zone of west winds in the Eastern Hemisphere
N75-12513
EQUIPMENT SPECIFICATIONS
The 20,000-RPM centrifuge --- design of portable spin test equipment
[SLA-74-204] N75-12336
EROSION
Erosive destruction by cavitation flow
N75-12237
Spatial and temporal variations in geometric and material properties of a natural beach --- a study of shoreline erosion in California
[AD-785572] N75-12389
ERROR ANALYSIS
User's guide to four-body and three-body trajectory optimization programs
[NASA-CR-139156] N75-12020
Error control in the GCF: An information-theoretic model for error analysis and coding
[NASA-CR-140852] N75-12171
Problem of the method of determining the composition of bottom deposits and suspensions --- analysis of sediment fall velocity errors
N75-12520
Reduction and error analysis of the AVE 2 pilot experiment data
[NASA-CR-120496] N75-12531
Analysis of ballistic calibration data and government/contractor CEP test data with respect to the AN/TPQ-27 contract incentive fee determination
[AD-781373] N75-12709
ERROR CORRECTING CODES
Error control in the GCF: An information-theoretic model for error analysis and coding
[NASA-CR-140852] N75-12171
ERROR DETECTION CODES
Colour television displays: Error diagrams for evaluating the reproduced chromaticities of some test colours --- reproduction by phosphors
[BBC-RD-1974/34] N75-12733
ERRORS
Error control in estimation of pilot stress by measuring skin resistance
N75-12610
ESCAPE [ABANDONMENT]
An emergency life saving instant exit system for cargo, cargo-transport and passenger aircraft, volume 2
[AD-778824] N75-11966
ESCAPE SYSTEMS
An emergency life saving instant exit system for cargo, cargo-transport and passenger aircraft, volume 2
[AD-778824] N75-11966
ESTIMATES
Estimated quantities of materials contained in a 1000-MW[e] PWR power plant
[ORNL-TM-4515] N75-12721
EUROPE
Translations on Eastern Europe: Scientific affairs, no. 439
[JPRS-63487] N75-12829
Translations on Eastern Europe: Scientific affairs, no. 438 --- electronics and laser research in Poland
[JPRS-63447] N75-12836
EVAPOTRANSPIRATION
Evapotranspiration: Agrometeorological aspect and evaluation of potential evapotranspiration
[MONO-65] N75-12482
EXCAVATION
Observations on blast explosions at Medeo, USSR, 1966
[FOA-4-C-4523-A1] N75-12156
EXCITATION
Method for determining minority carrier life in epitaxial silscon layers summary --- laser measurements
N75-12090
Infrared radiation from H2O, CO2 or NH3 collisionally excited by N2, O or Ar
[AD-785412] N75-12827
EXHALATION
Respiratory activity sensor using conducting paper
N75-12569
EXHAUST GASES
Formation of mixed molecular clusters in free-jet expansions --- air pollution from jet engine exhaust gases
[AD-785347] N75-12112
Automobile emission standards
[S-REPT-93-598] N75-12452
Experiments with a catalytic cleaner for car engine exhaust gases
[FOA-1-C-1492-H3] N75-12455
Dispersion simulation techniques for assessing the air pollution impacts of ground transportation systems
[ANL/ES-29] N75-12458
EXHAUST SYSTEMS
A 727/JT8D-100 series engine exhaust system propulsion performance model test
[NASA-CR-134617] N75-11984
EXOBIOLOGY
Space biology and aerospace medicine, volume 8, no. 5, 1974
[JPRS-63603] N75-12552
EXPEDITIONS
Basic goals and some results of the Soviet National Expedition TROPEX-72 [6 June - 19 September 1972]
N75-12502
EXPERIMENTAL DESIGN
Skylab program payload integration. TO27 sample array
[NASA-CR-120531] N75-12011
Reduction and error analysis of the AVE 2 pilot experiment data
[NASA-CR-120496] N75-12531
Laboratory research into human information processing --- pilot workload modeling
N75-12590
EXPLODING WIRES
Problems in the generation of extremely dense plasmas by means of electric wire explosions
N75-12781
EXPLORER 43 SATELLITE
Microscale Alfven waves in the solar wind at 1 AU
[NASA-TM-X-70793] N75-12874
EXPLOSIONS
Observations on blast explosions at Medeo, USSR, 1966
[FOA-4-C-4523-A1] N75-12156
EXPLOSIVE DEVICES
Feasibility of explosively driven hypervelocity projectiles --- acceleration of multiple gram-sized projectiles to ten kilometers per second
[AD-784271] N75-11907
EXPLOSIVE WELDING
Method of making an explosively welded scarf joint
[NASA-CASE-LAR-11211-1] N75-12326
EXPONENTIAL FUNCTIONS
Sample size determination for estimating parameters of the exponential distribution
[AD-785503] N75-12351
EXTERNAL STORES
A hypersonic force and moment test of a 0.006 scale model [466] of the 330.2 inch diameter external tank in the Ames Research Center 3.5 foot hypersonic wind tunnel [TA9F] --- space shuttle development
[NASA-CR-134425] N75-12032
EXTERNALLY BLOWN FLAPS
A wind tunnel investigation of the wake near the trailing edge of a deflected externally blown flap --- on a jet powered STOL transport aircraft
[NASA-TM-X-3079] N75-11896
Propulsion concepts for STOL aircraft --- high bypass turbofan engines and air supply system for wings with internally blown flaps
N75-11948
Noise of jets which are impinging on obstacles [for examples externally blown flaps] and possibilities of noise attenuation
N75-11951
EXTRAVEHICULAR ACTIVITY
Study of roles of remote manipulator systems and EVA for shuttle mission support, volume I
[NASA-CR-140364] N75-12036
EXTREMELY LOW RADIO FREQUENCIES
Solar-geophysical effects on northern and mid-latitude ELF propagation
[AD-785011] N75-12711
ULF measurements --- stimulation of ULF signals in magnetosphere
[AD-785482] N75-12714
EYE [ANATOMY]
Peculiarities in the formation of cataracts in mice after irradiation by 645 MeV protons and Co60 gamma rays
N75-12557
Recovery time after being dazzled, as a function of age --- eye adaptation in photostress
[FOA-2-C-2587-E1] N75-12576

F

F-14 AIRCRAFT
Specification for visual target acquisition system AN/AVG-8A [XJ-1] flight test program interface control document SH 4506-02-73
[AD-779909] N75-12769
FABRICATION
Fabrication technology: A compilation --- cutting and working with metals
[NASA-SP-5978(02)] N75-12162
Fabrication technology and materials --- for surface acoustic wave devices
N75-12699
FAILURE ANALYSIS
Major Item Special Study [MISS], CH-54A rotary wing blade
[AD-785554] N75-11906
Multiple fault gas path analysis applied to TF30-P-408 engine data
[AD-785265] N75-11996
Principles of the reliability theory of mechanical systems, chapter 8
[AD-785209] N75-12349
FALLING SPHERES
Measurements of the basic atmospheric parameters at Woomera using the falling sphere, August to November 1973
[WRE-TN-1246[WR-D]] N75-12466
FAR FIELDS
Fundamental and applied research on core engine/combustion noise of aircraft engines
[NASA-CR-140860] N75-11974
Measurement and analysis of aircraft far-field aerodynamic noise
[NASA-CR-2377] N75-11982
FAR INFRARED RADIATION
Far infrared absorption in small metallic particles
[COO-3151-38] N75-12708
FARM CROPS
Improved [ERTS] information and its impact on U.S. markets for agricultural commodities: A quantitiative economic investigation of production, distribution and net export effects
[NASA-CR-141044] N75-12424
FAST NEUTRONS
The effect of neutron irradiation on the structure and mechanical properties of carbon fibres
[ARL/MET-REPT-93] N75-12078
FATIGUE [BIOLOGY]
Variability in reaction response --- human response accuracy as function of training and fatigue
[FOA-2-C-2581-H5] N75-12586
FATIGUE [MATERIALS]
Load and environment interactions in fatigue crack growth
[AD-785249] N75-12374
FATIGUE LIFE
Fatigue crack propagation due to random amplitude vibrations: Prediction using constant amplitude data
[RD/B/N-2784] N75-12368
FEEDBACK CONTROL
Some basic properties of the payoffs defined by closed-loop strategies
[AD-784434] N75-12672
FERROMAGNETIC RESONANCE
Temperature dependence of the ferromagnetic resonance linewidth of lunar soils, iron and magnetite precipitates in simulated lunar glasses, and nonspherical metallic iron particles
[CONF-740321-2] N75-12106
FIBER OPTICS
Fiber coupled laser illuminator
[AD-785146] N75-12320
Fiber optic seals: Improved seal assemblies and inspection equipment for field use in international safeguards and arms control applications
[AD-785540] N75-12342
FIELD THEORY [ALGEBRA]
Dual trees and resummation theorems
[COO-2271-28] N75-12693
FIELD THEORY [PHYSICS]
Transient and steady-state velocity of domain walls for a complete range of drive fields
[NASA-CR-140942] N75-12694

Value of fundamental constants --- dependent on renormalized quantum field theory
[COO-2271-34] N75-12828

FIGHTER AIRCRAFT
Vertical and short take-off demonstrated by the VAK 191 B
N75-11939
Fighter aircraft engine dependability versus reconnaissance aircraft engine dependability when both aircraft use the same engine
[AD-785444] N75-11995

FINANCIAL MANAGEMENT
Description of some experimental methods with adaptive planning
[FOA-P-C-8339-M3] N75-12853

FINITE DIFFERENCE THEORY
Creation and comparison of finite difference analogs of some finite element schemes
[LA-UR-74-771] N75-12685

FINITE ELEMENT METHOD
Use of optimality criteria methods for large scale systems
N75-12358
Creation and comparison of finite difference analogs of some finite element schemes
[LA-UR-74-771] N75-12685

FINLAND
Technology and community development materials processing, and electrical and nuclear technology --- technical research center of Finland
N75-12695

FINS
Dispersion-strengthened metal fin structural test
[AD-785374] N75-12378

FIRE PREVENTION
Guide of fire protection in caves, canyons, and hot cells
[ARH-3020] N75-12163
Fire protection in electronic installations
[LA-TR-74-17] N75-12165
Systems study of an automated fire weather data system
[NASA-TM-X-62402] N75-12277
Optimal concepts of fire protection as a function of the importance of data processing installations
[LA-TR-74-20] N75-12850

FLAMEOUT
Effect of Oxygen addition on altitude blowout and relight of an experimental combustor segment
[NASA-TM-X-3154] N75-12070

FLAMES
Analysis of flame emissions by laser Raman spectroscopy
[SLL-74-5244] N75-12105

FLAMMABLE GASES
Oxygen concentration sensor for aircraft fuel tanks
[AD-785144] N75-11967

FLAPPING HINGES
Effects of wing/elevon gap sealing flapper doors on orbiter elevon effectiveness of model 16-0 in the NAAL 7.75 by 11 foot continuous flow wind tunnel (OA119A)
[NASA-CR-134421] N75-12035

FLASH LAMPS
Dye testing and evaluation program
[AD-784885] N75-12313
A high intensity flash X-ray tube
[FOA-2-C-2580-E8] N75-12716

FLAT PLATES
Application of wave mechanics theory to fluid dynamics problems: Flat plate flow
[NASA-CR-140848] N75-12229
Calculating the daily variations of solar energy incident on flat plates
[ORNL-TM-4564] N75-12886

FLIGHT
Parametric study of STOL short-haul engine cycles and operational techniques to minimize community noise impact
[NASA-CR-2486] N75-11910

FLIGHT CHARACTERISTICS
Technical problems encountered in the study of a dirigible freighter
[CEA-CONF-2580] N75-11899
Engineering design handbook: Helicopter performance testing
[AD-785000] N75-11965

FLIGHT CONTROL
Control authority with a flight performance controller --- development of aircraft system for pilot control of aircraft bank angle and vertical speed
[AD-784889] N75-11953
Flight control and procedures for stimulated visual approach and landing. Self-paced training package
[NASA-CR-140335] N75-11999
Manufacturing methods technology (MM and T) for ballistically tolerant replacement flight control components
[AD-785582] N75-12082
Deploy/release system --- model aircraft flight control
[NASA-CASE-LAR-11575-1] N75-12195

FLIGHT CREWS
Simulation and y of high workload operations -- - psychophysiolo, effects on air crews
[AGARD-CP-146] N75-12587
Systems simulation: A global approach to aircrew workload --- computerized systems analysis
N75-12588
Aircrew workload and human performance: The problem facing the operational commander --- human component in air weapons system
N75-12595
Endocrine-metabolic indices of aircrew workload: An analysis across studies
N75-12596
High workload tasks of aircrew in the tactical strike, attack and reconnaissance roles
N75-12601
The air defence role --- pilot training in complex tasks
N75-12602
Physiological costs of extended airborne command and control operations --- human performance and sleep deprivation
N75-12603
Application of human factors engineering data in medical evaluation of flight crews
N75-12611

FLIGHT PATHS
Parametric study of STOL short-haul engine cycles and operational techniques to minimize community noise impact
[NASA-CR-2486] N75-11910
A motion-constraint logic for moving-base simulators based on variable filter parameters
[NASA-TN-D-7777] N75-11933
Short course on STOL aircraft technology and the community, volume 1
N75-11938
Aspects of guidance and control for steep and curved approaches of STOL aircraft
N75-11945
Engineering flight test, AH-1G helicopter, heavyweight autorotational evaluation
[AD-785553] N75-11964
Leveling of elevations in blocks compiled from flight-line nets in phototriangulation
[AD-783830] N75-12426
Time-optimal control synthesis for non-linear systems: A flight dynamic example
[AD-785405] N75-12671
An orientable, stabilized balloon-borne gondola for around-the-world flights
N75-12743

FLIGHT SAFETY
An advanced air traffic management concept based on extension of the upgraded third generation ATC system. System B: Airport capacity analysis
[AD-785334] N75-11917
Synchronization station location study: Tradeoff phase
[AD-785335] N75-11921
An advanced air traffic management concept based on extensions of the upgraded third generation ATC system. System B: 1995 Los Angeles Basin traffic model, volume 1
[AD-785309] N75-11926
Measurement and estimation procedure for flight safety control operator workload
N75-12609

FLIGHT SIMULATION
Simulation of flight test conditions in the Langley pilot transonic cryogenic tunnel
[NASA-TN-D-7811] N75-12001
Some problems in evaluating the vestibular function of aviators and cosmonauts
N75-12561
Simulation of high workload operations in air to air combat
N75-12593

FLIGHT SIMULATORS
A motion-constraint logic for moving-base simulators based on variable filter parameters
[NASA-TN-D-7777] N75-11933
Analysis and compensation of an aircraft simulator control loading system with compliant linkage --- using hydraulic equipment
[NASA-TN-D-7747] N75-12003
Evaluating measures of workload using a flight simulator
N75-12591

FLIGHT STRESS (BIOLOGY)
Simulation and study of high workload operations -- - psychophysiological effects on air crews
[AGARD-CP-146] N75-12587
Endocrine-metabolic indices of aircrew workload: An analysis across studies
N75-12596
Time dependence of the flight induced increase of free urinary cortisol secretion in jet pilots
N75-12597
Emotional and biochemical effects of high workload --- in pilot landing performance
N75-12598
The air defence role --- pilot training in complex tasks
N75-12602
Physiological costs of extended airborne command and control operations --- human performance and sleep deprivation
N75-12603

FLIGHT TESTS
Engineering flight test, AH-1G helicopter, heavyweight autorotational evaluation
[AD-785553] N75-11964
Engineering design handbook: Helicopter performance testing
[AD-785000] N75-11965
Simulation of flight test conditions in the Langley pilot transonic cryogenic tunnel
[NASA-TN-D-7811] N75-12001
Development of a Stationary Plasma Motor (SPM) and its testing on the meteor
N75-12066
Airborne Visible Laser Optical Communications (AVLOC) experiment
[NASA-TM-X-64894] N75-12296

FLIGHT TRAINING
Flight control and procedures for stimulated visual approach and landing. Self-paced training package
[NASA-CR-140335] N75-11999

FLIP-FLOPS
On high level digital system design
[AD-785570] N75-12666

FLOODS
Application of expansions with respect to natural orthogonal components in the studies of drainage --- hydrometeorological factors during spring floods
N75-12517
Flood control laws using one and two reservoirs with an exponential type hydrograph
N75-12519

FLOW DISTORTION
Distortion in a full-scale bicone inlet with internal focused compression and 45 percent internal contraction
[NASA-TM-X-3133] N75-11970

FLOW DISTRIBUTION
A forebody design technique for highly integrated bottom-mounted scramjets with application to a hypersonic research airplane
[NASA-TM-X-71971] N75-11973
Study of the turbulent torque flow in a cylindrical model apparatus
N75-12232
On the flow near a weak shock wave downstream of a nozzle throat --- numerical analysis of pressure gradient, streamline curvature, and shock wave curvature
[AD-785283] N75-12257
The connection between intermittent turbulent activity near the wall of a turbulent boundary layer with pressure fluctuations at the wall
[AD-785271] N75-12258
Leeside flow field description over cones at large incidence
[AD-785369] N75-12260
A computer programme for flowfield predictions in the interaction of a shock wave with a 90 degree bend
[REPT-58] N75-12640

FLOW EQUATIONS
One-dimensional compressible gas flow in ducts
[ESDU-74028] N75-12223
Second and third order difference techniques for two-dimensional hyperbolic systems of conservation laws, with an application to transonic flow about an airfoil
[UCRL-51529] N75-12251
Nonuniform grid method for turbulent boundary layers
[SAND-74-5023] N75-12253

FLOW GEOMETRY
Application of wave mechanics theory to fluid dynamics problems: Boundary layer on a circular cylinder including turbulence
[NASA-CR-140849] N75-12230

FLOW MEASUREMENT
On the interpretation of the output of hot-film anemometers and a scheme of dynamic compensation for water temperature variation
[AD-784912] N75-12295

FLOW RESISTANCE
Effect of nonsymmetrical flow resistance upon orifice impedance resistance
[NASA-TM-X-72624] N75-12233

FLOW STABILITY
A shear flow instability due to the finite ion gyroradius
[MPI-PAE/EXTRATERR-96] N75-12774

FLOW THEORY
Theoretical prediction of thick wing and pylon-fuselage-fanpod-nacelle aerodynamic characteristics at subcritical speeds. Part I: Theory and results
[NASA-CR-137578] N75-11935
Application of linearized transonic theory to tunnel blockage interference --- calculated with equations of motion
[AD-785349] N75-12008

Application of wave mechanics theory to fluid dynamics problems: Fundamentals
[NASA-CR-140847] N75-12228
Application of wave mechanics theory to fluid dynamics problems: Flat plate flow
[NASA-CR-140848] N75-12229
FLUID DYNAMICS
Application of wave mechanics theory to fluid dynamics problems: Fundamentals
[NASA-CR-140847] N75-12228
Application of wave mechanics theory to fluid dynamics problems: Boundary layer on a circular cylinder including turbulence
[NASA-CR-140849] N75-12230
Third International Conference on Numerical Methods in Fluid Dynamics
[FOA-4-C-4518-A2] N75-12249
Dynamics of elastic shells containing acoustic medium with sources
[AD-785193] N75-12380
Magnetofluiddynamics --- conference
[DLR-MITT-74-20] N75-12779
FLUID FILTERS
A model for the electrostatic charging process in fuel filtration
[PUBL-74-4] N75-12205
FLUID FLOW
Flutter of conservative systems of pipes containing subsonic flow
[MERL-TN-73-2] N75-12236
The cavitation laboratory of the Swedish state shipbuilding experimental tank
[CIRC-32] N75-12250
The effect of material damping on the dynamics of a vertical tubular cantilever conveying fluid
[MERL-TN-74-1] N75-12355
FLUIDIC CIRCUITS
Some analogue control techniques in applied fluidics
[FOA-2-C-2576-E4] N75-12241
FLUTTER
Flutter of conservative systems of pipes containing subsonic flow
[MERL-TN-73-2] N75-12236
FLYBY MISSIONS
Mission design for a ballistic slow flyby Comet Encke 1980
[NASA-TN-D-7726] N75-12012
FLYING PLATFORMS
Analysis of unmanned, tethered, rotary-wind platforms
[AD-785581] N75-11903
FOG
An examination of whiteouts and transmission through ice fog in the visible and near infrared
[DREO-TN-74-18] N75-12467
Instrument for measuring the concentration of crystalline particles
N75-12503
An assessment of warm fog: Nucleation, control, and recommended research
[NASA-CR-2477] N75-12529
Fog and wind regimes of the Eureka-Arcata coastal region of northern California
[AD-785531] N75-12534
Effects of various runway lighting parameters upon the relation between runway visual range and visual range of centerline and edge lights in fog
[NASA-TM-X-72112] N75-12604
FOILS [MATERIALS]
Plasma chemistry and the dynamics of carbon foils irradiated by high intensity laser pulses
[LA-5532-MS] N75-12794
FOKKER-PLANCK EQUATION
Approximate Fokker-Planck operators for Coulomb collisions
[ORNL-TM-4605] N75-12815
FOOD
Non-caking freeze dried applesauce
[NASA-CR-140938] N75-12621
FORCE DISTRIBUTION
Nonlinear theory of a carrying surface in a non-compressible flow
[AD-785113] N75-12266
FOREBODIES
A forebody design technique for highly integrated bottom-mounted scramjets with application to a hypersonic research airplane
[NASA-TM-X-71971] N75-11973
FOREIGN POLICY
Energy and security: Implications for American policy
[AD-785084] N75-12857
FORESTS
Systems study of an automated fire weather data system
[NASA-TM-X-62402] N75-12277
Inventory of forest and rangeland resources, including forest stress --- Colorado, Georgia, and Black Hills, South Dakota
[E75-10032] N75-12402
A study of Minnesota forests and lakes using data from Earth Resources Technology Satellites
[NASA-CR-140865] N75-12421
FORMING TECHNIQUES
Fabrication technology: A compilation --- cutting and working with metals
[NASA-SP-5978[02]] N75-12162
Development of an improved technique for forming acrylic spheres --- application to underwater habitation and exploration
[AD-784113] N75-12337
FORTRAN
FORTRAN program for calculating the trajectory of projectiles
[FOA-2-A-2564-D8] N75-11894
The Mark 4 supersonic-hypersonic arbitrary body program. Volume 3: Program listings
[AD-778445] N75-12057
Computer treatment of climatic research data. Table type B
[FOA-1-C-1504-M4[H5-H6]] N75-12624
NBS FORTRAN test programs. Volume 2: Listings for version 1
[NBS-SP-399-VOL-2] N75-12628
NBS FORTRAN test programs. Volume 3: Listings for Version 3
[NBS-SP-399-VOL-3] N75-12629
FORTRAN dialects: A selection
[FOA-1-C-1500-M4] N75-12636
Introduction to the structure of dialogue directed computer programs
[FOA-P-C-8361-M3] N75-12638
Flexible table printing subroutines in FORTRAN
[FOA-2-C-2590-E5] N75-12657
FRACTURE MECHANICS
A spectrum truncation and damage tolerance study associated with the C-5A outboard pylon aft truss lugs
[AD-785196] N75-11955
Fracture toughness characterization of shipbuilding steels
[AD-785034] N75-12141
Weakening of an elastic solid by a rectangular array of cracks
[AD-785436] N75-12379
FRACTURE STRENGTH
Effects of microstructural modification on titanium toughness and fatigue
[AD-785409] N75-12139
FRACTURES [MATERIALS]
Alternating method applied to edge and surface crack problems
[NASA-CR-140846] N75-12353
FRAGMENTATION
Unified model of solar system and galaxy formation based on explosive fragmentation
[LA-5364] N75-12877
FRAGMENTS
Measurement of splinter retardation by means of Doppler radar, introductory points of view
[FOA-2-C-2567-D4] N75-11895
Examination of an object from space
[FOA-1-A-1562-F5] N75-12023
Apparatus for the automatic recorded weighing of fragments
[FOA-2-A-2568-D4] N75-12286
FRANCE
Climatological elements of the coasts of Metropolitan France [Atlantic] --- wind, sea state, visibility, temperature
[MONO-93-VOL-2] N75-12484
Climatological elements of the coasts of Metropolitan France [North Sea, Channel] --- wind, sea state, visibility, temperature
[MONO-93-VOL-1] N75-12485
Climatological elements of the coasts of Metropolitan France [Mediterranean] --- wind, sea state, visibility, temperature
[MONO-93-VOL-3] N75-12486
FREE FLOW
Drag force on objects in the nearly free molecular flow regime as a function of speed ratio
[AD-785351] N75-12265
FREE RADICALS
Application of stable nitroxide free radicals in solution to low magnetic field measurements
[CEA-R-4540] N75-12707
FREEZE DRYING
Non-caking freeze dried applesauce
[NASA-CR-140938] N75-12621
FREEZING
Irrigation scheduling, freeze warning and soil salinity detecting --- Cameron County, Texas
[E75-10046] N75-12414
Calculating the depth of the freezing of swamps of the flat bog type in the example of the Tarman bog
N75-12522
FREQUENCY MODULATION
Analysis of an impulse noise suppressor for FM demodulators
[NASA-CR-120492] N75-12198
FREQUENCY SHIFT KEYING
The design of multiple access frequency hopping patterns
[AD-785381] N75-12183
FREQUENCY STABILITY
UHF television: Requirements for long-term and short-period carrier drive frequency stability
[BBC-RD-1974/33] N75-12167
FRICTION FACTOR
Friction and temperature rise in aircraft tires
[NASA-CR-134666] N75-11929
FROST
The influence of frost formation and defrosting on the performance of air coolers
[WTHD-63] N75-12238
FRUITS
Non-caking freeze dried applesauce
[NASA-CR-140938] N75-12621
FUEL CAPSULES
Design of a heat source for a Navy radioisotopic power generator --- use of plutonium in fuel capsules
[MLM-2103] N75-12444
FUEL CELLS
Electrolyte for hydrocarbon air fuel cells --- including propane oxidation
[AD-784236] N75-12451
FUEL COMBUSTION
Catalytic breakdown of hydrazine
[FOA-1-C-1488-D3] N75-12154
FUEL CONTROL
Turbine engine fuel control reliability test and evaluation
[AD-785580] N75-11994
FUEL INJECTION
Effect of interjet spacing on mixing of multiple coaxial jets in supersonic flow
[NASA-CR-2469] N75-12248
Performance and durability of improved air-atomizing splash-cone fuel nozzles
[NASA-TM-X-3156] N75-12334
FUEL OILS
The approaching energy crisis: A call for action
N75-12432
FUEL SYSTEMS
Turbine engine fuel control reliability test and evaluation
[AD-785580] N75-11994
FUEL TANKS
Oxygen concentration sensor for aircraft fuel tanks
[AD-785144] N75-11967
FUELS
Iron titanium hydride as a source of hydrogen fuel for stationary and automotive applications
[BNL-18651] N75-12441
FUSION
On the possibilities of a directly igniting fusion charge --- by electron beam or laser irradiation
[FOA-4-C-4530-A1] N75-12095
Tritium economy and tritium safety of fusion power plants
[IPP-4/112] N75-12728
FUSION [MELTING]
Investigation of solidification in zero-gravity environment: M553 sphere forming experiment. Nickel-silver alloy evaluation
[NASA-CR-129034] N75-12017
Prospects for laser fusion
[UCRL-75691] N75-12309

G

GALACTIC RADIATION
The 100 micron surveys in the Northern and Southern Hemispheres --- balloon-borne instrument general sky survey
N75-12737
Multicolour far infrared photometry of galactic H2 regions --- data acquisition using high altitude balloons
N75-12741
A high sensitivity balloon-borne X-ray telescope system
N75-12754
GALAXIES
Stellar content of the nuclei of elliptical galaxies determined from 2.3 micron CO band strengths
[NASA-CR-140859] N75-12861
Unified model of solar system and galaxy formation based on explosive fragmentation
[LA-5364] N75-12877
GALLIUM ALLOYS
Superconducting properties of bulk and thin film A15 compounds
[AD-785014] N75-12818
GALLIUM ARSENIDES
Monolithic laser --- gallium indium arsenide optical transmitter
[AD-785021] N75-12325
GAME THEORY
Some basic properties of the payoffs defined by closed-loop strategies
[AD-784434] N75-12672
GAMMA RAYS
Cosmic gamma-ray bursts: A review of the observational data
[LA-UR-74-833] N75-12888
GAPS
Effects of wing/elevon gap sealing flapper doors on orbiter elevon effectiveness of model 16-0 in the NAAL 7.75 by 11 foot continuous flow wind tunnel [OA119A]
[NASA-CR-134421] N75-12035

GARNETS
The deposition of Er-Eu-Ga-F c0e garnet single crystal films
[AD-785511] N75-12111
GARP ATLANTIC TROPICAL EXPERIMENT
Basic goals and some results of the Soviet National Expedition TROPEX-72 [6 June - 19 September 1972]
N75-12502
GAS ANALYSIS
Oxygen concentration sensor for aircraft fuel tanks
[AD-785144] N75-11967
Report on attendance at Arbeitstagung: Gase in Metallen at Darmstadt and visits to August-Thyssen-Hutte AG at Duisburg and the Max Planck Institute at Stuttgart, March 1972
[FOA-4-C-4519-F3] N75-12126
Nulling device for detection of trace gases by NDIR absorption
[NASA-CASE-ARC-10760-1] N75-12275
Methods for analysis of nitrogen monoxide and nitrogen dioxide in the atmosphere and in exhaust gases. A literature search
[FOA-1-C-1469-H3] N75-12454
GAS CHROMATOGRAPHY
Report on the 9th International Symposium on Chromatography
[FOA-1-C-1489-C4] N75-12096
GAS COOLED REACTORS
Optimization of carbon dioxide gas turbine loops
N75-11975
GAS DETECTORS
Oxygen concentration sensor for aircraft fuel tanks
[AD-785144] N75-11967
GAS DISCHARGES
Stratification phenomena in the positive column of a low pressure oxygen discharge
[AD-783054] N75-12803
GAS DYNAMICS
Drag force on objects in the nearly free molecular flow regime as a function of speed ratio
[AD-785351] N75-12265
The influence of heat treatment on a magnetogasdynamic flow
N75-12783
The Pitot pressure in magnetogasdynamic flows
N75-12787
GAS EXPANSION
Analysis of the working process of a free piston expander
N75-12240
GAS FLOW
Multiple fault gas path analysis applied to TF30-P-408 engine data
[AD-785265] N75-11996
The cryogenic wind tunnel concept for high Reynolds number testing
[NASA-TN-D-7762] N75-12000
One-dimensional compressible gas flow in ducts
[ESDU-74028] N75-12223
Low-pressure measurement by thermistor, and orifice-effect determination in rarefied gas flows
[RAE-LIB-TRANS-1734] N75-12224
GAUST: A computer program for calculating gas flow from holders containing condensed gas
[FOA-1-C-1498-C3[H6]] N75-12247
Cluster intensity and velocity measurements in condensed flows
[AD-785348] N75-12264
Pulsed electromagnetic gas acceleration
[NASA-CR-140996] N75-12775
GAS LASERS
Exploratory studies of diffusion laser modifications --- modification in HF DF gas laser
[AD-785400] N75-12322
GAS PRESSURE
Low-pressure measurement by thermistor, and orifice-effect determination in rarefied gas flows
[RAE-LIB-TRANS-1734] N75-12224
GAS TURBINE ENGINES
Effect of Oxygen addition on altitude blowout and relight of an experimental combustor segment
[NASA-TM-X-3154] N75-12070
GAS TURBINES
Optimization of carbon dioxide gas turbine loops
N75-11975
Constant-volume gas turbine: Experiments with gaseous fuel in butterfly valved combustors
[ARL/ME-NOTE-347] N75-11976
Turbine gas temperature measurement and control system
[NASA-CR-140971] N75-11987
Turbine engine fuel control reliability test and evaluation
[AD-785580] N75-11994
Exploratory investigation for reducing labyrinth seal leakage in high pressure ratio gas turbines
[AD-781005/4] N75-12341
GAS-LIQUID INTERACTIONS
A study on gas-liquid contact apparatus rotary atomizer
[BULL-93] N75-12231
GAS-METAL INTERACTIONS
Report on attendance at Arbeitstagung: Gase in Metallen at Darmstadt and visits to August-Thyssen-Hutte AG at Duisburg and the Max Planck Institute at Stuttgart, March 1972
[FOA-4-C-4519-F3] N75-12126
GASEOUS DIFFUSION
Absorption studies with pentanes for labeling pore structure and material transport in porous silica
N75-12145
Exploratory studies of diffusion laser modifications --- modification in HF DF gas laser
[AD-785400] N75-12322
GASOLINE
Storage stability of federal specification gasolines
[AD-784282] N75-12160
GEOLOGICAL FAULTS
Hydrologic significance of lineaments in central Tennessee
[E75-10030] N75-12401
GEOLOGICAL SURVEYS
A study of the usefulness of Skylab EREP data for earth resources studies in Australia --- Australia geology
[E75-10047] N75-12415
GEOLOGY
Geotechnological methods for mineral production --- in the U.S.S.R.
[JPRS-63469] N75-12386
An interdisciplinary analysis of multispectral satellite data for selected cover types in the Colorado Mountains, using automatic data processing techniques --- hydrology, ecology, geology, vegetation, and mineral deposits
[E75-10002] N75-12390
New theoretical models and ratio imaging techniques associated with the NASA earth resources spectral information system
[NASA-CR-140357] N75-12417
GEOMAGNETISM
Power supply for Helmholtz coils --- for use in spectrometer
[AREAEE-177] N75-12212
Modelling geomagnetic polarity transitions
[AD-785255] N75-12480
GEOMORPHOLOGY
Technogenic-glacial mud and rock flow in the Khibin mountain mass
N75-12521
GEOPHYSICAL OBSERVATORIES
Seismic magnitudes from explosions and earthquakes obtained at the Hagfors and Matsushiro Observatories
[FOA-C-20010-T1] N75-12465
GEOPHYSICS
Soviet bloc research in geophysics, astronomy, and space, no. 337
[JPRS-63543] N75-12384
Soviet bloc research in geophysics, astronomy, and space, no. 336
[JPRS-63427] N75-12385
Remote sensing geophysics from Skylab --- Southern California and Nevada minerals and rocks
[E75-10045] N75-12413
GEOPOTENTIAL
New version of the program for operative objective analysis of the geopotential of isobaric surfaces
N75-12511
GEORGIA
Inventory of forest and rangeland resources, including forest stress --- Colorado, Georgia, and Black Hills, South Dakota
[E75-10032] N75-12402
GEOSTROPHIC WIND
Effect of bottom relief on the geostrophic wind currents
N75-12498
GERMANIUM
X-ray topographic study of crystal defects produced by diffusion of additive elements in single germanium crystals
N75-12089
GERMANIUM ALLOYS
Superconducting properties of bulk and thin film A15 compounds
[AD-785014] N75-12818
GERMANY
Energy and the environment in Baden-Wuerttemberg
[KFK-1966-UF] N75-12439
GLACIAL DRIFT
Technogenic-glacial mud and rock flow in the Khibin mountain mass
N75-12521
GLASS
Strength and durability of a glass-ceramic containing spodumene crystals
[AD-783087/0] N75-12151
Characterization of self-focusing mechanisms in laser materials
[UCRL-13597] N75-12308
GLASS FIBERS
Effect of loading rate on crack growth in glass-epoxy sheet
[AD-785519] N75-12149
GLUES
Investigations into the creep and ageing behaviour of glued metal joints
[RAE-LIB-TRANS-1793] N75-12365
GONDOLAS
An orientable, stabilized balloon-borne gondola for around-the-world flights
N75-12743
The stellar and solar tracking system of the Geneva Observatory gondola
N75-12753
A high sensitivity balloon-borne X-ray telescope system
N75-12754
GRANITE
Experimental measurement of in situ stress in granite by hydraulic fracturing
[LA-5605-MS] N75-12388
GRAPHITE
Vaporization kinetics and thermodynamics of graphite using the high pressure mass spectrometer
[AD-785136] N75-12113
GRAPHS [CHARTS]
Inaccuracy in measurements and calibrations
[FOA-3-C-3734-E8] N75-12206
GRASHOF NUMBER
Numerical and experimental studies of the natural convection within a horizontal cylinder
[NASA-TN-D-7728] N75-12244
GRAVITATIONAL EFFECTS
The generation of gravitational waves. 1. Weak-field sources: A plug-in-and-grind formalism
[NASA-CR-140864] N75-12872
GRAVITATIONAL WAVES
The generation of gravitational waves. 1. Weak-field sources: A plug-in-and-grind formalism
[NASA-CR-140864] N75-12872
GROUND EFFECT MACHINES
Ground effect devices for transport of personnel and goods over short distances using air suspension
[FOA-2-A-2566-F8[F3]] N75-11897
GROUND STATE
The nu sub 2 band CHD3; ground state parameters for CHD3 from combination differences
[NASA-CR-140861] N75-12088
GROUND STATIONS
Synchronization station location study: Tradeoff phase
[AD-785335] N75-11921
GROUND SUPPORT EQUIPMENT
In-airframe ground runup noise suppressor program
[AD-785246] N75-11986
GROUND SUPPORT SYSTEMS
The National Scientific Balloon Facility --- balloon launching capabilities of ground facility
N75-12751
Air Force Cambridge Research Laboratories balloon operations
N75-12752
GROUND-AIR-GROUND COMMUNICATIONS
The TAM-TAM system --- development of air-ground-air data transmission link for air traffic control
[RAE-LIB-TRANS-1756] N75-11913
Error control in the GCF: An information-theoretic model for error analysis and coding
[NASA-CR-140852] N75-12171
GROUP DYNAMICS
Individual differences in an organizational setting: Interrelationships and influences
[AD-785003] N75-12615
Empirical findings and suggestions for future research on organizational communication
[AD-785002] N75-12843
GUIDANCE [MOTION]
Neighboring optimal guidance theory and computer program
[NASA-CR-140332] N75-12631
GULF OF MEXICO
An assessment of the potential contributions to oceanography from Skylab visual observations and hand-held photography --- Pacific Ocean, Atlantic Ocean and Gulf of Mexico
[E75-10017] N75-12396
GUN LAUNCHERS
Analysis of delivery accuracy for AH-1G [Cobra] launched 2.75-inch rockets from tests conducted January - March 1972 at China Lake, California
[AD-782978] N75-12891
GUNN DIODES
Investigation of the physical origins of noise in Avalanche and Gunn oscillators and noise reduction techniques
[AD-780935/3] N75-12217
GYROSCOPES
Summarized results of tests on Singer-Kearfott's gyroflex gyro
[FOA-2-A-2562-E4] N75-12282
GYROSTABILIZERS
AIROscope: Ames infrared balloon-borne telescope
N75-12747

H

H-54 HELICOPTER
U. S. Army helicopter electrical system reliability and maintainability investigation. Volume 1: Document deficiency analysis
[AD-785573] N75-11961
U. S. Army helicopter electrical system reliability and maintainability investigation. Volume 2: Supplemental design guide
[AD-785574] N75-11962

HAFNIUM
The effect of hafnium in unalloyed construction steels similar to St 52-3, considering especially the hot forming behavior of sulfidic inclusions
N75-12121

HALIDES
Studies on non-crystalline iron halogenid layers by application of Mossbauer spectroscopy
N75-12119

HANDBOOKS
Engineering design handbook: Environmental series. Part one: Basic environmental concepts
[AD-784999] N75-12461
Continental hydrology. Terms and definitions. GOST 19179-73
N75-12526

HARDNESS TESTS
Hardness behavior of binary and ternary niobium alloys at 77 and 300 K
[NASA-TN-D-7847] N75-12127

HEART DISEASES
ECG changes in the MX, DS and MC leads in cases of focal and diffuse damage to the cardiac muscle
N75-12570

HEART RATE
Quantitative analysis of psychophysical stress in operating complex dynamic systems
N75-12606
Heart rate and sinusoidal arrythmia Measurement in view of objectivating concentration and stress in control tasks
N75-12608
United States Navy physiological telemetry system operation and maintenance manual --- for conveying heart rate and core temperature
[AD-785273] N75-12619

HEAT BALANCE
Study of the heat balance in the boundary layer of the atmosphere according to experimental data
N75-12514

HEAT FLUX
Instrument to measure radiant heat fluxes --- principles and construction of absolute two-sided radiometer
N75-12280
Study of the heat balance in the boundary layer of the atmosphere according to experimental data
N75-12514

HEAT MEASUREMENT
Instrument to measure radiant heat fluxes --- principles and construction of absolute two-sided radiometer
N75-12280

HEAT PIPES
Structural heat pipe --- for spacecraft wall thermal insulation system
[NASA-CASE-GSC-11619-1] N75-12222

HEAT RESISTANT ALLOYS
Chemical milling --- the selective or overall removal of high strength, heat resistant metals and alloys from metal parts
[SLL-74-5001] N75-12164

HEAT SHIELDING
Mechanical properties of Skylab thermal shield materials after prolonged ultraviolet irradiation
[NASA-TN-D-7844] N75-12144

HEAT SOURCES
Design of a heat source for a Navy radioisotopic power generator --- use of plutonium in fuel capsules
[MLM-2103] N75-12444

HEAT TRANSFER
Liquid metal cooling of turbine blades
[RAE-LIB-TRANS-1713] N75-11977
The influence of frost formation and defrosting on the performance of air coolers
[WTHD-63] N75-12238
Investigation of the heat exchange in demountable connections of cryogenic systems
N75-12239
Numerical and experimental studies of the natural convection within a horizontal cylinder
[NASA-TN-D-7728] N75-12244
Approximate analysis of heat transfer in transpired boundary layers at limiting Prandtl numbers
[AD-785239] N75-12255
Effect of shock impingement on heat transfer. Part 2: Effect of shear layer impingement on pressure and heat transfer rate distribution around a cylinder
[AD-778962] N75-12269
Operating characteristics of 120-millimeter-bore ball
[NASA-TN-D-7837] N75-12330
Total heat transfer to the atmosphere from the ocean surface in the vicinity of formation of Hurricane Hilda
N75-12516

HEAT TRANSMISSION
Process environment effects on heat pipes for fluidbed gasification of coal
[LA-UR-74-984] N75-12252
Excitation of plane thermoelastic waves in a layer with a finite rate of heat propagation
[AD-785190] N75-12820

HEAT TREATMENT
The alpha-beta titanium alloys. A comparison of the heat treatment and properties of the alloys: Ti-6Al-4V, Ti-6Al-6V-2Sn and Ti-6Al-6V-2Sn-6Zr
[RAE-LIB-TRANS-1797] N75-12125
The influence of heat treatment on a magnetogasdynamic flow
N75-12783

HELICOPTER ENGINES
Turbine engine fuel control reliability test and evaluation
[AD-785580] N75-11994

HELICOPTER PERFORMANCE
Engineering design handbook: Helicopter performance testing
[AD-785000] N75-11965

HELICOPTERS
A wind-tunnel investigation of parameters affecting helicopter directional control at low speeds in ground effect
[NASA-TN-D-7694] N75-11931
Information on attack helicopters: A comparison
[FOA-2-C-2597-F8] N75-11934
Two-dimensional subsonic evaluation of a 15-percent thick circulation control airfoil with slots at leading and trailing edges
[AD-785230] N75-11954
Manufacturing methods technology [MM and T] for ballistically tolerant replacement flight control components
[AD-785582] N75-12082
Correlation of missions 191, 51M and helicopter photography --- aerial photography and mapping of three areas in Test Site 175 in Texas
[NASA-CR-134289] N75-12279
Design and development testing of free planet transmission concept
[AD-782857/7] N75-12338

HELIUM-OXYGEN ATMOSPHERES
Content of glycogen and glucoso-6-phosphatase activity in the tissues of rabbits after prolonged exposure to the increased pressure of a helium-oxygen atmosphere
N75-12558

HELMETS
Qualification test report bump protection hat [subassembly of T020/M509 head protective assembly]
[NASA-CR-140347] N75-12618

HELMHOLTZ VORTICITY EQUATION
Evaluating the Helmholtz integral. Part 1: Basic theory --- with closed form representation as line integral
[AD-785013] N75-12715

HEMODYNAMICS
Regional hemodynamics in antiorthostatic tests of different intensity
N75-12564
Wearing of anti-G suit by persons with reduced orthostatic stability
N75-12565

HEURISTIC METHODS
Heuristic-adaptive search for regimes in a string of data
[AD-784473] N75-12650

HIGH ALTITUDE
Estimates of radiation exposure from solar cosmic rays in SST altitudes
[NASA-TM-X-71990] N75-12883

HIGH ALTITUDE BALLOONS
Telescope Systems for Balloon-Borne Research
[NASA-TM-X-62397] N75-12735
Balloon-borne infrared coronagraph --- application to solar observations
N75-12736
The 100 micron surveys in the Northern and Southern Hemispheres --- balloon-borne instrument general sky survey
N75-12737
Astronomical observations with the University College London balloon borne telescope
N75-12738
The Liege-balloon program --- balloon-borne instruments for high-spectral resolution observations of the sun
N75-12739
A balloon-borne 1 meter telescope for far-infrared astronomy
N75-12740
Multicolour far infrared photometry of galactic H2 regions --- data acquisition using high altitude balloons
N75-12741
Design and performance of a 39cm balloon-borne telescope
N75-12742
An orientable, stabilized balloon-borne gondola for around-the-world flights
N75-12743
A cooled telescope for infrared balloon astronomy
N75-12744
A balloon-borne cryogenically cooled filter radiometer
N75-12745
Ultraviolet stellar spectrophotometry from a balloon platform
N75-12746
AIROscope: Ames infrared balloon-borne telescope
N75-12747
Balloon platform for extended-life astronomy research
N75-12748
Low-background air-infrared telescope for balloon-borne infrared astronomy
N75-12749
Sky survey at far infrared wavelengths using a balloon-borne telescope
N75-12750
The National Scientific Balloon Facility --- balloon launching capabilities of ground facility
N75-12751
Air Force Cambridge Research Laboratories balloon operations
N75-12752
The stellar and solar tracking system of the Geneva Observatory gondola
N75-12753
A high sensitivity balloon-borne X-ray telescope system
N75-12754
Balloon-borne ultraviolet stellar spectrometer: Acquisition, tracking and command systems
N75-12755
Stabilization, pointing and command control of a balloon-borne 1-meter telescope
N75-12756
AIROscope stellar acquisition
N75-12757
The AIROscope pointing and stabilization system
N75-12758
Balloon infrared astronomy platform [BIRAP] --- development and characteristics of a balloon-borne attitude control system
N75-12759
A general purpose stabilised balloon platform
N75-12760
NCAR telemetry and command system --- development of system for recovering and reproducing data from balloon-borne experiments
N75-12761
Airoscope telemetry system --- development of data link from balloon gondola to ground station
N75-12762
Airoscope command system --- pulse code modulation telemetry command system for data link with balloons
N75-12763

HIGH FREQUENCIES
Review of current radar interests and extending the radar spectrum to the HF and the milimeter wave bands
[AD-785007] N75-12190

HIGH PRESSURE
Vaporization kinetics and thermodynamics of graphite using the high pressure mass spectrometer
[AD-785136] N75-12113

HIGH RESOLUTION
High resolution imaging in bright and dark field at high voltages
[LBL-2712] N75-12765

HIGH STRENGTH ALLOYS
Prevention and control of subcritical crack growth in high-strength metals
[AD-785233] N75-12135
Chemical milling --- the selective or overall removal of high strength, heat resistant metals and alloys from metal parts
[SLL-74-5001] N75-12164

HIGH TEMPERATURE FLUIDS
High-temperature thermodynamic properties of sodium
[ANL-8095] N75-12102

HIGH TEMPERATURE LUBRICANTS
Operating characteristics of 120-millimeter-bore ball
[NASA-TN-D-7837] N75-12330

HIGH TEMPERATURE TESTS
Hardness behavior of binary and ternary niobium alloys at 77 and 300 K
[NASA-TN-D-7847] N75-12127

HIGH VOLTAGES
High voltage supplies for electric thrusters
[RAE-LIB-TRANS-1773] N75-12062
A high intensity flash X-ray tube
[FOA-2-C-2580-E8] N75-12716
High resolution imaging in bright and dark field at high voltages
[LBL-2712] N75-12765

HISTORIES
Fiftieth anniversary of the Belorussian Hydrometeorological Service
N75-12489

Reconstruction of past climatic variability
[AD-785395] N75-12536

HOLOGRAPHY
Holo-scanner technique for wideband recording
[AD-785396] N75-12293
Investigation of a photodichroic material for holographic storage and recovery
[AD-785274] N75-12768

HOMING
Homing, chapter 6 --- radio control and command for missiles
N75-12173

HOT WORKING
The effect of hafnium in unalloyed construction steels similar to St 52-3, considering especially the hot forming behavior of sulfidic inclusions
N75-12121

HOT-FILM ANEMOMETERS
On the interpretation of the output of hot-film anemometers and a scheme of dynamic compensation for water temperature variation
[AD-784912] N75-12295

HOT-WIRE ANEMOMETERS
King's law coefficients computation method for linearization of the constant temperature anemometer
[AAAF-NT-74-2] N75-12274

HOVERING
Engineering design handbook: Helicopter performance testing
[AD-785000] N75-11965

HUGONIOT EQUATION OF STATE
Determining particle density using known material Hugeniot curves
[NASA-CASE-LAR-11059-1] N75-12810

HUMAN BODY
Concept of the characteristic time of biological processes and its application for studying the dynamics of gas exchange
N75-12554
ECG changes in the MX, DS and MC leads in cases of focal and diffuse damage to the cardiac muscle
N75-12570
Determination of total body calcium [skeletal mass] in man by in vivo neutron activation analysis and total body counting
[TID-26613] N75-12581

HUMAN FACTORS ENGINEERING
Application of human factors engineering data in medical evaluation of flight crews
N75-12611
Man as a precious resource: The enhancement of human effectiveness in air transport operations
[AD-785368] N75-12620

HUMAN PERFORMANCE
Model of human dynamic orientation --- associated with vestibular stimuli
[NASA-CR-132537] N75-12585
Simulation and study of high workload operations --- psychophysiological effects on air crews
[AGARD-CP-146] N75-12587
Simulation of high workload operations in air to air combat
N75-12593
Aircrew workload and human performance: The problem facing the operational commander --- human component in air weapons system
N75-12595
Long range air-to-air refuelling: A study of duty and sleep patterns
N75-12600
Human information processing: An assessment and research battery
[AD-785411] N75-12613

HUMAN REACTIONS
Function of perception of space coordinates during vestibular trained by active, passive and complex methods
N75-12563
Phagocytic activity of human blood neutrophils under ordinary conditions of vital functioning and in an isolation chamber
N75-12571
Variability in reaction response --- human response accuracy as function of training and fatigue
[FOA-2-C-2581-H5] N75-12586

HUMAN TOLERANCES
Some regularities in adaptation to prolonged rotation --- improved human tolerance to weightlessness
N75-12562
Regional hemodynamics in antiorthostatic tests of different intensity
N75-12564
Wearing of anti-G suit by persons with reduced orthostatic stability
N75-12565

HURRICANES
Total heat transfer to the atmosphere from the ocean surface in the vicinity of formation of Hurricane Hilda
N75-12516
The nonlinear growth of hurricanes through CISK
[AD-782662/1] N75-12535

HYBRID CIRCUITS
Development for application of parylene coatings --- to hybrid microcircuits devices
[NASA-CR-120536] N75-12208

HYBRID COMPUTERS
Skylab mission planning support through the use of a hybrid simulation
[NASA-TM-X-64889] N75-12037

HYDRAULIC ANALOGIES
Some analogue control techniques in applied fluidics
[FOA-2-C-2576-E4] N75-12241

HYDRAULIC SHOCK
Experimental measurement of in situ stress in granite by hydraulic fracturing
[LA-5605-MS] N75-12388

HYDRAULIC TEST TUNNELS
The cavitation laboratory of the Swedish state shipbuilding experimental tank
[CIRC-32] N75-12250

HYDRAZINES
Studies on N2 fixation in transition metal complexes of chromium, molybdenum, and tungsten
N75-12118
Catalytic breakdown of hydrazine
[FOA-1-C-1488-D3] N75-12154

HYDRIDES
Iron titanium hydride as a source of hydrogen fuel for stationary and automotive applications
[BNL-18651] N75-12441

HYDROCARBON FUELS
A model for the electrostatic charging process in fuel filtration
[PUBL-74-4] N75-12205

HYDROCARBONS
Electrolyte for hydrocarbon air fuel cells --- including propane oxidation
[AD-784236] N75-12451

HYDRODYNAMICS
Mathematical models for some problems in water conservation
[PT-1972:7] N75-12387
Computation of real-time currents off Southern California with multi-layer hydrodynamical-numerical models
[AD-785245] N75-12541

HYDROFLUORIC ACID
Rotational relaxation measurements and resonant phenomena in laser-excited hydrogen fluoride
[AD-784952] N75-12321

HYDROGEN
Hydrogen solubility in 1:5 compounds between Y or Th and Ni or Co
[COO-3429-19] N75-12076
High pressure differential thermal analysis experiments with the LaNi5-H system
[SLA-74-5322] N75-12101
Solubility of H2 in RCo3 compounds
[COO-3429-20] N75-12108
Metal hydrides as hydrogen storage media
[BNL-18887] N75-12440
Iron titanium hydride as a source of hydrogen fuel for stationary and automotive applications
[BNL-18651] N75-12441
Effect of charge exchange reactions on neoclassical transport
[ORNL-TM-4606] N75-12727

HYDROGEN EMBRITTLEMENT
The resistance of selected high strength alloys to embrittlement by a hydrogen environment --- iron and cobalt base alloys
[NASA-CR-140957] N75-12115
The resistance to embrittlement by a hydrogen environment of selected high strength iron-manganese base alloys
[NASA-CR-140956] N75-12116

HYDROGRAPHY
Method of measuring areas by a curvometer --- hydrographic areas from topographic maps
N75-12504
Flood control laws using one and two reservoirs with an exponential type hydrograph
N75-12519

HYDROLOGY
An interdisciplinary analysis of multispectral satellite data for selected cover types in the Colorado Mountains, using automatic data processing techniques --- hydrology, ecology, geology, vegetation, and mineral deposits
[E75-10002] N75-12390
Hydrologic significance of lineaments in central Tennessee
[E75-10030] N75-12401
A Skylab program for the International Hydrological Decade [IHD] --- Lake Ontario Basin
[E75-10039] N75-12408
Meteorology and hydrology, no. 8, 1974 --- climatology, agriculture meteorology, weather forecasting, and hydrology
[JPRS-63560] N75-12488
Meteorology and hydrology, no. 9, 1974 --- microclimatology, agricultural meteorology, weather forecasting, climate control, and hydrological forecasting
[JPRS-63569] N75-12507
Lakes of Mongolia
N75-12525
Continental hydrology. Terms and definitions. GOST 19179-73
N75-12526

HYDROMETEOROLOGY
Fiftieth anniversary of the Belorussian Hydrometeorological Service
N75-12489
Basic goals and some results of the Soviet National Expedition TROPEX-72 [6 June - 19 September 1972]
N75-12502
Automated remote measuring system in agrometeorology
N75-12518

HYPERBOLIC SYSTEMS
Second and third order difference techniques for two-dimensional hyperbolic systems of conservation laws, with an application to transonic flow about an airfoil
[UCRL-51529] N75-12251

HYPERSONIC FLOW
Hypersonic flow around blunt body at angles of attack
[ISAS-515-VOL-39-12] N75-12246
Numerical solutions to the full viscous shock layer equations using an alternating direction implicit technique
[AD-785242] N75-12256

HYPERSONIC VEHICLES
Transonic and supersonic wind tunnel test of the action hypervelocity test missile. Volume 1: Stability characteristics
[AD-785565] N75-11904
Transonic and supersonic wind tunnel test of the action hypervelocity test missile. Volume 2: Drag characteristics
[AD-785566] N75-11905

HYPERSONIC WIND TUNNELS
A hypersonic force and moment test of a 0.006 scale model [466] of the 330.2 inch diameter external tank in the Ames Research Center 3.5 foot hypersonic wind tunnel [TA9F] --- space shuttle development
[NASA-CR-134425] N75-12032

HYPERVELOCITY LAUNCHERS
Feasibility of explosively driven hypervelocity projectiles --- acceleration of multiple gram-sized projectiles to ten kilometers per second
[AD-784271] N75-11907

HYPERVELOCITY PROJECTILES
Feasibility of explosively driven hypervelocity projectiles --- acceleration of multiple gram-sized projectiles to ten kilometers per second
[AD-784271] N75-11907

HYPOKINESIA
Morphocytochemical reaction of the suprarenals and thymic-lymphatic system of rats after termination of hypokinesia
N75-12556
Effect of 30-day hypokinesia on the dynamics of higher nervous activity and sleep of an operator
N75-12566

HYPOXIA
Activity of blood enzymes in rabbits exposed to high-mountain hypoxia
N75-12559

I

IBM 360 COMPUTER
LECO: A compacting and editing program
[FOA-P-C-8353-M3[E5]] N75-12634
Introduction to LECO
[FOA-P-C-8355-M3[E5]] N75-12635
PL360 compiler with macros
[FOA-P-C-8359-M3[E5]] N75-12639
Computer program for town analysis. Changes arising from converting from IBM 7090 to IBM 360/75 --- computerized rescue operations simulation
[FOA-4-C-4515-A4] N75-12859

ICE
An examination of whiteouts and transmission through ice fog in the visible and near infrared
[DREO-TN-74-18] N75-12467

ICE FORMATION
The influence of frost formation and defrosting on the performance of air coolers
[WTHD-63] N75-12238

ICE PREVENTION
Liquid ice prevention and control chemicals for use on airfield pavements
[AD-785319] N75-12007

IDEAL GAS
On master Boltzmann equation
[ISAS-516-VOL-39-13] N75-12678

IDENTIFYING
Mathematical modelling and identification theory
[AD-785425] N75-12687

IGNITION SYSTEMS
On the possibilities of a directly igniting fusion charge --- by electron beam or laser irradiation
[FOA-4-C-4530-A1] N75-12095

ILLIAC 3 COMPUTER
Taxicrinic processors of the Illiac 3: Architectural design
[TID-26602] N75-12664
ILLUMINATORS
Fiber coupled laser illuminator
[AD-785146] N75-12320
IMAGE CORRELATORS
Correlation and registration of ERTS multispectral imagery --- by a digital processing technique
[NASA-CR-134294] N75-12420
IMAGE ENHANCEMENT
Review of an amplifier tube for pictures at low light levels
[FOA-2-C-2585-E1-E3] N75-12889
IMAGE FURNACES
An arc imaging furnace for the characterization of thermally protective materials
[AD-785586] N75-12055
IMAGE MOTION COMPENSATION
A motion-constraint logic for moving-base simulators based on variable filter parameters
[NASA-TN-D-7777] N75-11933
IMAGE TUBES
Review of an amplifier tube for pictures at low light levels
[FOA-2-C-2585-E1-E3] N75-12889
IMAGERY
The effect of stochastic interferences on the acoustic holographic imagery of objects
N75-12284
IMAGING TECHNIQUES
Preprocessing and feature extraction for automatic recognition of radar images
[AD-785427] N75-12186
New theoretical models and ratio imaging techniques associated with the NASA earth resources spectral information system
[NASA-CR-140357] N75-12417
Interactive digital image processing and display system
[UCRL-75655] N75-12646
High resolution imaging in bright and dark field at high voltages
[LBL-2712] N75-12765
Studies of monochromatic, quasi-monochromatic and broadband imaging techniques: A generalized imaging integral
[AD-785269] N75-12770
IMBEDDINGS (MATHEMATICS)
Conversion of boundary-value problems into stable initial-value problems via several invariant imbedding algorithms
[SAND-74-5018] N75-12644
IMPACT RESISTANCE
Impact resistance of hybrid composite fan blade materials
[NASA-CR-134712] N75-12077
Computer simulation of the threshold sensitivity determinations
[NASA-TN-D-7663] N75-12690
IMPACT TESTS
Qualification test report bump protection hat [subassembly of T020/M509 head protective assembly]
[NASA-CR-140347] N75-12618
Computer simulation of the threshold sensitivity determinations
[NASA-TN-D-7663] N75-12690
IMPLOSIONS
Prospects for laser fusion
[UCRL-75691] N75-12309
IMPULSES
Analysis of an impulse noise suppressor for FM demodulators
[NASA-CR-120492] N75-12198
INCOMPRESSIBLE FLOW
Effect of blade row geometry on axial flow rotor unsteady response to inflow distortions
[AD-785276] N75-11991
Application of wave mechanics theory to fluid dynamics problems: Boundary layer on a circular cylinder including turbulence
[NASA-CR-140849] N75-12230
Similarity solutions of the boundary layer equations for flow over a moving wall
[AD-781496/5] N75-12259
Nonlinear theory of a carrying surface in a noncompressible flow
[AD-785113] N75-12266
INDEXES (DOCUMENTATION)
Index of Skylab data available at Colorado School of Mines --- multispectral photography of Colorado
[E75-10041] N75-12410
FOA Index adaptation of ILO's information system ISIS for operating in the Computer Center, Stockholm in cooperation with the State Office
[FOA-P-C-8360-M7] N75-12654
AGARD index of publications, 1952 - 1970. Part 3: Author index. Part 4: Addendum to Part 1
[AGARD-INDEX-52/70] N75-12847
INDIAN OCEAN
Causes of the explosive onset and limits of propagation of the summer monsoon in the Indian Ocean
N75-12512
INDIUM
The viscosity of indium [3] halides
N75-12072
INDIUM ANTIMONIDES
Electrical conduction through thermal and anodic oxides of indium antimonide
[AD-785078] N75-12819
INDIUM ARSENIDES
Monolithic laser --- gallium indium arsenide optical transmitter
[AD-785021] N75-12325
INDUCTION MOTORS
Test apparatus for motor and magnetic bearing
N75-12051
The torques occurring in the starting of polyphase induction-motors with squirrel-cage rotors
[RAE-LIB-TRANS-1782] N75-12211
INDUSTRIAL MANAGEMENT
An exploration into the practices of DCAS industrial specialists in obtaining contractor production information on high priority, medium value contracts
[AD-785441] N75-12854
INDUSTRIES
Energy consumption by industries in support of national defense: An energy demand model
[AD-784964] N75-12449
INERTIA
Command electronics of the inertia wheel
N75-12052
INERTIAL GUIDANCE
Modular digital missile guidance system study
[AD-784969] N75-12054
INERTIAL NAVIGATION
Depot requirements for base level data on aircraft inertial platforms
[AD-785443] N75-11914
Proceedings of Quarterly Meeting of Life Cycle Cost Task Group of the Joint Services Data Exchange for Inertial Systems
[AD-785391] N75-11918
A description of a life cycle cost model for inertial navigation systems --- using FORTRAN 4
[AD-785392] N75-11922
INERTIAL REFERENCE SYSTEMS
Proceedings of Quarterly Meeting of Life Cycle cost task group of the joint services data exchange for inertial systems
[AD-785390] N75-11915
INFORMATION
The value of improved [ERS] information based on domestic distribution effects of U.S. agriculture crops
[NASA-CR-141046] N75-12423
INFORMATION SYSTEMS
Texas Biannual of Electronics Research No. 19 --- progress in solid state electronics and information systems
[AD-784968] N75-12218
Evaluation of Skylab imagery as an information service for investigating land use and natural resources
[E75-10018] N75-12397
The role of ERTS in the establishment and of a nationwide land cover information system
[NASA-CR-141045] N75-12425
FOA Index adaptation of ILO's information system ISIS for operating in the Computer Center, Stockholm in cooperation with the State Office
[FOA-P-C-8360-M7] N75-12654
Katowice Main Information Science Center described
N75-12830
Installation of R-20 computer described
N75-12831
INFORMATION THEORY
Error control in the GCF: An information-theoretic model for error analysis and coding
[NASA-CR-140852] N75-12171
Signal processing
[CEA-CONF-2584] N75-12180
Boundary and object detection in real world images --- by means of algorithms
[NASA-CR-140828] N75-12734
Information theory aspects of long range analyses
[FOA-2-C-2568-E1] N75-12848
INFRARED ASTRONOMY
A balloon-borne 1 meter telescope for far-infrared astronomy
N75-12740
Low-background air-infrared telescope for balloon-borne infrared astronomy
N75-12749
The AIROscope pointing and stabilization system
N75-12758
Balloon infrared astronomy platform [BIRAP] --- development and characteristics of a balloon-borne attitude control system
N75-12759
Airoscope telemetry system --- development of data link from balloon gondola to ground station
N75-12762
INFRARED DETECTORS
Multicolour far infrared photometry of galactic H2 regions --- data acquisition using high altitude balloons
N75-12741
A cooled telescope for infrared balloon astronomy
N75-12744
AIROscope: Ames infrared balloon-borne telescope
N75-12747
Low-background air-infrared telescope for balloon-borne infrared astronomy
N75-12749
Sky survey at far infrared wavelengths using a balloon-borne telescope
N75-12750
Stabilization, pointing and command control of a balloon-borne 1-meter telescope
N75-12756
The AIROscope pointing and stabilization system
N75-12758
Electrical conduction through thermal and anodic oxides of indium antimonide
[AD-785078] N75-12819
INFRARED IMAGERY
Determination of points of entry for potential contaminants into limestone aquifers using thermal infrared imagery
[NASA-CR-120540] N75-12546
Balloon-borne infrared coronagraph --- application to solar observations
N75-12736
The 100 micron surveys in the Northern and Southern Hemispheres --- balloon-borne instrument general sky survey
N75-12737
INFRARED LASERS
Laser cane for the blind
[FOA-2-C-2595-H5] N75-12300
Dye testing and evaluation program
[AD-784885] N75-12313
ARPA-NRL laser program --- chemical, gas, and infrared lasers
[AD-785234] N75-12315
INFRARED RADIATION
Stabilization, pointing and command control of a balloon-borne 1-meter telescope
N75-12756
A correction for middleton's visible and infrared radiation extinction coefficients due to rain
[AD-785121] N75-12771
Infrared radiation from H2O, CO2 or NH3 collisionally excited by N2, O or Ar
[AD-785412] N75-12827
INFRARED SPECTRA
Microwave and infrared observations of molecular spectra in Comet Kohoutek
[NASA-CR-140955] N75-12845
INITIATORS (EXPLOSIVES)
Improved hot-wire electroexplosive devices --- testing concepts for improving initiation safety
[LA-UR-74-743] N75-12157
INPUT/OUTPUT ROUTINES
Input-output interfaces for the D17B bus-structured I/O system
[AD-785128] N75-12627
Routines for using screen presentation of EMR 6130 equipment --- written in FORTRAN
[FOA-3-C-3727-E5] N75-12637
A system for input and output of digital pictures
[FOA-2-C-2573-E1] N75-12660
INSTRUMENT FLIGHT RULES
An advanced air traffic management concept based on extensions of the upgraded third generation ATC system. System B: Discrete Address Beacon System [DABS] accuracy and coverage requirements
[AD-785311] N75-11925
INSTRUMENT LANDING SYSTEMS
An advanced air traffic management concept based on extension of the upgraded third generation ATC system. System B: Airport capacity analysis
[AD-785334] N75-11917
Development of microwave landing system implementation criteria
[AD-785220] N75-12005
Instrument landing system improvement program: Environmental study of the 200 foot aperture slotted cable localizer antenna array
[AD-785025] N75-12009
INTEGRATED CIRCUITS
Development of integrated circuits
N75-12839
INTERCOSMOS SATELLITES
Operation of Polish equipment used on Interkosmos space satellite described --- specifically - radiospectrograph onboard Intercosmos-Kopernik 500 satellite
N75-12833
INTERFACES
Interface message processors for the ARPA computer network
[AD-784951] N75-12665
INTERFERENCE DRAG
Space shuttle launch vehicle [13 P-OTS] strut support interference effects study in the Rockwell International 7- by 7-foot trisonic wind tunnel [IA68]
[NASA-CR-134427] N75-12830
INTERFEROMETRY
Interferometric study of some organotin polymers
[DSL-TN-388] N75-12092
Optical stellar interferometry for satellite surveillance
[AD-784947] N75-12066

INTERMOLECULAR FORCES
Fundamental studies in isotope chemistry --- relationship between isotope effects and molecular and intermolecular forces
[COO-3498-15] N75-12075
INTERNAL COMBUSTION ENGINES
Dispersion simulation techniques for assessing the air pollution impacts of ground transportation systems
[ANL/ES-29] N75-12458
INTERNAL COMPRESSION INLETS
Distortion in a full-scale bicone inlet with internal focused compression and 45 percent internal contraction
[NASA-TM-X-3133] N75-11970
INTERNATIONAL TRADE
The approaching energy crisis: A call for action
N75-12432
INTERPLANETARY MAGNETIC FIELDS
On the use of Godhavn H-component as an indicator of the interplanetary sector polarity
[NASA-CR-140858] N75-12867
INTERPLANETARY SPACECRAFT
Visiting the solar family --- U.S.S.R. and United States of America unmanned spacecraft and planetary probes
[NASA-TT-F-14795] N75-12013
INTERSTELLAR MATTER
Nucleosynthesis of light elements in stellar atmospheres and in interstellar matter
N75-12868
INTERSTELLAR SPACE
Interstellar scattering of pulsar radiation. 1: Scintillation
[NASA-TM-X-70789] N75-12887
INVISCID FLOW
A forebody design technique for highly integrated bottom-mounted scramjets with application to a hypersonic research airplane
[NASA-TM-X-71971] N75-11973
Second and third order difference techniques for two-dimensional hyperbolic systems of conservation laws, with an application to transonic flow about an airfoil
[UCRL-51529] N75-12251
Analytical study of subsonic turbulent boundary layer separation including viscous-inviscid interaction
[NASA-CR-140958] N75-12254
IODIDES
The viscosity of indium [3] halides
N75-12072
ION EXCHANGE MEMBRANE ELECTROLYTES
Mathematical modeling of Donnan dialysis; a continuous ion exchange membrane process
[SRO-810-1] N75-12547
ION IMPLANTATION
Structural analysis on silicon after implantation of carbon ions in the energy region of 1 to 3 MeV
N75-12146
ION PROPULSION
The analysis and design of satellite stabilisation systems using ion propulsion
[RAE-LIB-TRANS-1775] N75-12027
The conception and realisation of sub-assemblies for the temperature control of a microthruster. Optimisation by development of a mathematical model
[RAE-LIB-TRANS-1757] N75-12067
ION SCATTERING
Energy distributions of ions from a pulsed vacuum arc
[SLA-74-5034] N75-12795
IONIC MOBILITY
Osmosis and ion transport in charged porous membranes: A macroscopic, mechanistic model --- analysis of continuum flow in charged, macroscopic pores through a charged membrane
[PUBL-74-6] N75-12242
IONIZING RADIATION
Environmental microbiology as related to planetary quarantine --- synergetic effect of heat and radiation
[NASA-CR-140941] N75-12622
Effects of ionizing radiation on diffused resistors
[SLA-74-5148] N75-12717
IONOSPHERE
The E region of this ionosphere at night time: A literature study
[FOA-3-C-3731-E1] N75-12472
IONOSPHERIC DRIFT
A shear flow instability due to the finite ion gyroradius
[MPI-PAE/EXTRATERR-96] N75-12774
IONOSPHERIC SOUNDING
Statistical characteristics of the vertical moisture profile in the case of cumulus clouds
N75-12495
IRIDIUM
X-ray spectrographic determination of iridium in LiH or LiD
[LA-5564] N75-12104
Catalytic breakdown of hydrazine
[FOA-1-C-1488-D3] N75-12154
IRON
The resistance of selected high strength alloys to embrittlement by a hydrogen environment --- iron and cobalt base alloys
[NASA-CR-140957] N75-12115
IRON ALLOYS
The resistance to embrittlement by a hydrogen environment of selected high strength iron-manganese base alloys
[NASA-CR-140956] N75-12116
IRON COMPOUNDS
Studies on non-crystalline iron halogenid layers by application of Mossbauer spectroscopy
N75-12119
Mapping exposed silicate rock types and exposed ferric and ferrous compounds from a space platform
[E75-10008] N75-12392
Iron titanium hydride as a source of hydrogen fuel for stationary and automotive applications
[BNL-18651] N75-12441
IRRIGATION
Irrigation scheduling, freeze warning and soil salinity detecting --- Cameron County, Texas
[E75-10046] N75-12414
ISOBARS
Relation of the wind and baric fields in the stratosphere and the lower mesosphere of the tropical zone of the Northern Hemisphere
N75-12493
ISOBARS [PRESSURE]
New version of the program for operative objective analysis of the geopotential of isobaric surfaces
N75-12511
ISOTHERMAL PROCESSES
Study of phase transformations in titanium alloy. 3: Study of isothermal transformations of Beta 3 titanium alloy
[CEA-R-4567] N75-12130
ISOTHERMS
User's guide for program ISOPLT to plot isotherms
[SLA-74-242] N75-12647
ISOTOPE EFFECT
Fundamental studies in isotope chemistry --- relationship between isotope effects and molecular and intermolecular forces
[COO-3498-15] N75-12075
ISOTROPISM
Proton tissue dose for the blood forming organ in human geometry: Isotropic radiation
[NASA-TM-X-3089] N75-12573
IUE
The SAS-D nutation control system
[NASA-TM-X-65944] N75-12039

J

JAPAN
Long range weather forecasting in Japan
N75-12524
JET AIRCRAFT
A wind tunnel investigation of the wake near the trailing edge of a deflected externally blown flap --- on a jet powered STOL transport aircraft
[NASA-TM-X-3079] N75-11896
Interactive computer-aided design aircraft flying qualities program. Volume 1: Users manual
[AD-785101] N75-11957
Interactive computer-aided design aircraft flying qualities program. Volume 2: Methods formulation manual
[AD-785102] N75-11958
Interactive computer-aided design aircraft flying qualities program. Volume 3: Computer programming manual
[AD-785103] N75-11959
Interactive computer-aided design aircraft flying qualities program. Volume 4: Program assessment/correlation report
[AD-785104] N75-11960
Fighter aircraft engine dependability versus reconnaissance aircraft engine dependability when both aircraft use the same engine
[AD-785444] N75-11995
JET AIRCRAFT NOISE
STOL aircraft design approaches: Noise considerations and performance tradeoffs --- lift devices
N75-11940
Europlane QTOL: Design parameter tradeoffs
N75-11942
Noise of jets which are impinging on obstacles [for examples externally blown flaps] and possibilities of noise attenuation
N75-11951
Acoustic attenuation design requirements established through EPNL parametric trades
[NASA-CR-120986] N75-11985
In-airframe ground runup noise suppressor program
[AD-785246] N75-11986
Research on noise generated by ducted air-fuel combustion systems
[AD-785028] N75-11992
JET ENGINES
Fundamental and applied research on core engine/combustion noise of aircraft engines
[NASA-CR-140860] N75-11974
A 727/JT8D-100 series engine exhaust system propulsion performance model test
[NASA-CR-134617] N75-11984
Formation of mixed molecular clusters in free-jet expansions --- air pollution from jet engine exhaust gases
[AD-785347] N75-12112
Heat resistant titanium alloys. Introduction of the alloy UT 651A
[RAE-LIB-TRANS-1790] N75-12123
JET EXHAUST
Some results of aeroacoustic research --- effect of shrouded nozzle configurations on jet noise
N75-11950
JET FLOW
Additional two-dimensional wake and jet-like flows
[AD-785522] N75-12262
JET IMPINGEMENT
Noise of jets which are impinging on obstacles [for examples externally blown flaps] and possibilities of noise attenuation
N75-11951
JET MIXING FLOW
Effect of interjet spacing on mixing of multiple coaxial jets in supersonic flow
[NASA-CR-2469] N75-12248
JOINTS [ANATOMY]
The mobility of the human arm: Motion analysis and possibilities of a simplified kinematical prosthetic system
N75-12551
Orthotic arm joint --- for use in mechanical arms
[NASA-CASE-MFS-21611-1] N75-12616
JOINTS [JUNCTIONS]
Method of making an explosively welded scarf joint
[NASA-CASE-LAR-11211-1] N75-12326
Analysis and design of composite bonded joints under a dynamic type load
[AD-785433] N75-12375
JUPITER [PLANET]
Jupiter radiation belt models [July 1974]
[NASA-CR-140845] N75-12869
Jupiters radiation belts and their effects on spacecraft
[NASA-CR-140841] N75-12870
JUPITER PROBES
Pioneer Jupiter/Saturn press reference
N75-12879

K

KALMAN FILTERS
Modified post-flight processor for CIRIS
[AD-785370] N75-11916
KANSAS
Detection of moisture and moisture related phenomena from Skylab --- Kansas, Oklahoma, and Arkansas
[E75-10035] N75-12405
KENTUCKY
Applicability of Skylab remote sensing for detection and monitoring of surface mining activities --- strip mining and reclamation in Kentucky and Tennessee
[E75-10038] N75-12407
KOHOUTEK COMET
Microwave and infrared observations of molecular spectra in Comet Kohoutek
[NASA-CR-140955] N75-12865

L

LABORATORIES
Short description of the thermonuclear facilities of the I. V. Kurchatov Institute for Nuclear Energy
[ANL-TRANS-952] N75-12722
LABORATORY EQUIPMENT
Chamber for decompressing the caudal part of the animal body
N75-12568
LAKE MICHIGAN
Field investigations of heated discharges from nuclear power plants on Lake Michigan, 1972
[ANL/ES-32] N75-12457
LAKE ONTARIO
A Skylab program for the International Hydrological Decade [IHD] --- Lake Ontario Basin
[E75-10039] N75-12408
LAKES
A study of Minnesota forests and lakes using data from Earth Resources Technology Satellites
[NASA-CR-140865] N75-12421
Analytical modeling of thermal discharges. A review of the state of the art
[ANL/ES-18] N75-12456
Lakes of Mongolia
N75-12525
LAMINAR BOUNDARY LAYER
Application of wave mechanics theory to fluid dynamics problems: Flat plate flow
[NASA-CR-140848] N75-12229
Sweep effect on the drag of rows of perpendicular circular cylinders in a laminar boundary layer at supersonic free-stream velocities
[NASA-TN-D-7812] N75-12235

Weak incident shock interactions with Mach 8 laminar boundary layers --- of flat plate [NASA-TN-D-7835] N75-12243
Approximate analysis of heat transfer in transpired boundary layers at limiting Prandtl numbers [AD-785239] N75-12255
Additional two-dimensional wake and jet-like flows [AD-785522] N75-12262

LAMINAR FLOW
Application of wave mechanics theory to fluid dynamics problems: Flat plate flow [NASA-CR-140848] N75-12229
Nonuniform grid method for turbulent boundary layers [SAND-74-5023] N75-12253

LAMINATES
Impact resistance of hybrid composite fan blade materials [NASA-CR-134712] N75-12077
Filamentary composite laminates subjected to biaxial stress fields [AD-785362] N75-12081
Mechanical properties of Skylab thermal shield materials after prolonged ultraviolet irradiation [NASA-TN-D-7844] N75-12144
Effect of loading rate on crack growth in glass-epoxy sheet [AD-785519] N75-12149

LAND MANAGEMENT
The role of ERTS in the establishment and of a nationwide land cover information system [NASA-CR-141045] N75-12425

LAND USE
Evaluation of Skylab imagery as an information service for investigating land use and natural resources [E75-10018] N75-12397
Urban and regional land use analysis: CARETS and census cities experiment package [E75-10019] N75-12398
Study of recreational land and open space using Skylab imagery [E75-10020] N75-12399
Study of recreational land and open space using Skylab imagery --- southeast Michigan [E75-10034] N75-12404
Detection of moisture and moisture related phenomena from Skylab --- Kansas, Oklahoma, and Arkansas [E75-10035] N75-12405
Definition of heavy industry, guidelines for acceptable manufacturing uses, and plan for manufacturing gases in Delaware's coastal zone N75-12855
Public land use controls in Delaware's coastal zone N75-12856

LANDING AIDS
Consideration of near field effects in Microwave Landing System [MLS] feasibility evaluation [AD-784854] N75-12004

LANDING GEAR
Development and applications of the air cushion landing system --- to reduce ground pressure in conditions of poor soil strength N75-11952

LANDING SIMULATION
Flight control and procedures for stimulated visual approach and landing. Self-paced training package [NASA-CR-140335] N75-11999

LANDSLIDES
Technogenic-glacial mud and rock flow in the Khibin mountain mass N75-12521

LANTHANUM COMPOUNDS
High pressure differential thermal analysis experiments with the LaNi5-H system [SLA-74-5322] N75-12101

LARGE SCALE INTEGRATION
Design, processing, and testing of LSI arrays for space station [NASA-CR-120539] N75-12437

LARGE SPACE TELESCOPE
Research study on stabilization and control modern sampled-data control theory. Design of the Large Space Telescope system [NASA-CR-120534] N75-12669

LASER DOPPLER VELOCIMETERS
Laser Doppler velocimetry in chemical laser studies [SAND-74-5006] N75-12311
Application of a dual beam laser velocimeter to turbulent flow measurements [AD-785352] N75-12324
Application of a single laser Doppler system to the measurement of atmospheric winds [NASA-TM-X-64891] N75-12462

LASER HEATING
Plasma chemistry and the dynamics of carbon foils irradiated by high intensity laser pulses [LA-5532-MS] N75-12794

LASER OUTPUTS
Method for determining minority carrier life in epitaxial silicon layers summary --- laser measurements N75-12090
Experiment with laser communication [FOA-2-C-2575-E2] N75-12298
Laser pulse propagation code [LA-5607-MS] N75-12307
Lamp code users guide --- numerical analysis of laser outputs in either active or passive host media [UCID-16525] N75-12310
Changes in mass of biological cells when irradiated with Q-pulsed ruby laser [FOA-2-C-2586-E6] N75-12578
Aspects of plasmadynamic lasers: High outputs at short wavelengths N75-12790
On producing a CO2-laser medium for high output with an electric discharge in a supersonic flow N75-12791

LASER PLASMAS
Fast expanding carbon plasma jets as laser-active medium? N75-12789

LASERS
Analysis of flame emissions by laser Raman spectroscopy [SLL-74-5244] N75-12105
Holo-scanner technique for wideband recording [AD-785396] N75-12293
On the possibilities of using a laser in transmission equipment for sighting measurements [FOA-P-C-8362-M7] N75-12297
Two-dimensional calculations of high density laser induced fusion: Study of symmetry and Taylor instability [UCRL-74926] N75-12302
Laser systems for laser fusion [UCRL-75367] N75-12303
Study of the neon-oxygen laser under heavy particle bombardment [COO-2007-45] N75-12306
Characterization of self-focusing mechanisms in laser materials [UCRL-13597] N75-12308
Prospects for laser fusion [UCRL-75691] N75-12309
Response of materials to laser radiation: A short course [AD-785010] N75-12314
Effects of high power lasers, no. 3 [AD-785401] N75-12316
High energy laser windows [AD-784991] N75-12319
Fiber coupled laser illuminator [AD-785146] N75-12320
Laser backscatter characteristics of materials of interest in Ballistic Missile Defense [BMD] [AD-785393] N75-12323
Monolithic laser --- gallium indium arsenide optical transmitter [AD-785021] N75-12325
Translations on Eastern Europe: Scientific affairs, no. 438 --- electronics and laser research in Poland [JPRS-63447] N75-12836
Development of laser technology N75-12841

LATERAL CONTROL
Aerodynamic roll damping of a T-tail transport configuration [NASA-TM-X-3115] N75-11898

LATITUDE MEASUREMENT
A mid-latitude ozone model for the US standard atmosphere, 1975 [summary] [NASA-TM-X-70786] N75-12469

LAUNCH VEHICLE CONFIGURATIONS
Space shuttle launch vehicle [13 P-OTS] strut support interference effects study in the Rockwell International 7- by 7-foot trisonic wind tunnel [IA68] [NASA-CR-134427] N75-12030

LAUNCHING BASES
The National Scientific Balloon Facility --- balloon launching capabilities of ground facility N75-12751

LEADING EDGES
Effects of leading edge sweep angle and design lift coefficient on performance of a modified arrow wing at a design Mach number of 2.6 [NASA-TN-D-7753] N75-11893
Cascade tests of serrated leading edge blading at high subsonic speeds [NASA-CR-2472] N75-11983

LEAKAGE
Exploratory investigation for reducing labyrinth seal leakage in high pressure ratio gas turbines [AD-781005/4] N75-12341

LEAST SQUARES METHOD
King's law coefficients computation method for linearization of the constant temperature anemometer [AAAF-NT-74-2] N75-12274
Application of the least square method to magnetic resonance techniques [CEA-R-4511] N75-12346
Modified Gram Schmidt orthogonalization and its applications, including constrained least squares approximation [SLL-74-200] N75-12683

LECTURES
Report on the 9th International Symposium on Chromatography [FOA-1-C-1489-C4] N75-12096

LENGTH
Simplified method of measuring the length of highly sinuous rivers N75-12505

LETHALITY
Molecular basis for the mutagenic and lethal effects of ultraviolet irradiation [COO-3232-3] N75-12548

LEUKOCYTES
Phagocytic activity of human blood neutrophils under ordinary conditions of vital functioning and in an isolation chamber N75-12571

LIBRARIES
New version of the program for operative objective analysis of the geopotential of isobaric surfaces N75-12511

LIFE SUPPORT SYSTEMS
Methods of cleaning and servicing air supplies, and their control [FOA-1-A-1561-H3] N75-12453
Space biology and aerospace medicine, volume 8, no. 5, 1974 [JPRS-63603] N75-12552

LIFT
Nonlinear theory of a carrying surface in a noncompressible flow [AD-785113] N75-12266

LIFT DEVICES
Application of the nonlinear theory of a lifting surface to the calculation of aerodynamic characteristics of a triangular wing moving close to the earth's surface [AD-785154] N75-11901
STOL aircraft design approaches: Noise considerations and performance tradeoffs --- lift devices N75-11940
For STOL capability N75-11943

LIFTING REENTRY VEHICLES
Dispersion-strengthened metal fin structural test [AD-785374] N75-12378

LIGHT (VISIBLE RADIATION)
An examination of whiteouts and transmission through ice fog in the visible and near infrared [DREO-TN-74-18] N75-12467
A correction for middleton's visible and infrared radiation extinction coefficients due to rain [AD-785121] N75-12771

LIGHT ADAPTATION
Recovery time after being dazzled, as a function of age --- eye adaptation in photostress [FOA-2-C-2587-E1] N75-12576

LIGHT AMPLIFIERS
Review of an amplifier tube for pictures at low light levels [FOA-2-C-2585-E1-E3] N75-12289

LIGHT BEAMS
The radial free flight arc N75-12788

LIGHT MODULATION
Active circuits for integrated optics. Study of a transverse electro-optical effect modulator [LCR-73-133/R/G.5] N75-12193
Power requirements for magneto-optic modulation devices, a theoretical study [AD-784977] N75-12772

LIGHT TRANSMISSION
Laser pulse propagation code [LA-5607-MS] N75-12307
Lamp code users guide --- numerical analysis of laser outputs in either active or passive host media [UCID-16525] N75-12310
Effect of light on respiration and development of photosynthetic cells [COO-3231-2] N75-12549

LIGHT WATER BREEDER REACTORS
Experimental determination of countercurrent two-phase flow of water --- light water breeder reactors [ORO-4348-1] N75-12731

LIMBS (ANATOMY)
A feasibility study of limb volume measuring systems [NASA-CR-140330] N75-12580

LIMESTONE
Determination of points of entry for potential contaminants into limestone aquifers using thermal infrared imagery [NASA-CR-120540] N75-12546

LINEAR EQUATIONS
Direct method based projections for solving systems of linear equations [IS-3396] N75-12680

LINEAR FILTERS
Filters for oscillations of compex shape using varistors and varicaps N75-12203
Interdigital transducers and acoustic-surface-wave filters N75-12698

LINEAR PROGRAMMING
REBAL computer program series for linear propagation of uncertainty [ANCR-1153] N75-12641

A decomposition method for the solution of dual-angular integer programs
[AD-785568] N75-12651

LINEAR SYSTEMS
The stability and response of linear systems. Part 2: Methods of displaying stability characteristics
[ESDU-74020-PT-2] N75-12673
Algorithms for projection methods for solving linear systems of equations
[IS-3397] N75-12684

LINEAR TRANSFORMATIONS
A three dimensional variable node isoparametric solid element --- linear stress analysis
[AD-785353] N75-12377

LINEARIZATION
King's law coefficients computation method for linearization of the constant temperature anemometer
[AAAF-NT-74-2] N75-12274

LIQUEFIED NATURAL GAS
A survey of LNG technological needs in the USA: 1974 to beyond 2000
N75-12435

LIQUID CRYSTALS
Use of cholesteric liquid crystals for locating voids in adhesively bonded helicopter rotor blades
[AD-785502] N75-11963
Study of molecular dynamics in nematic and isotropic phases of liquid crystals
[CEA-R-4492] N75-12099
Self-focusing and optical-field-induced effects in liquids and liquid crystals
[LBL-2592] N75-12767

LIQUID FLOW
Measurements of gas component and duration time in the liquid phase of two and three component systems in bubble column reactors --- for aerobic fermentation
N75-12285

LIQUID HELIUM
A balloon-borne cryogenically cooled filter radiometer
N75-12745

LIQUID PHASES
Report on the 9th International Symposium on Chromatography
[FOA-1-C-1489-C4] N75-12096

LIQUID POTASSIUM
Liquid metal cooling of turbine blades
[RAE-LIB-TRANS-1713] N75-11977

LIQUID PROPELLANT ROCKET ENGINES
Status of flow separation prediction in liquid propellant rocket nozzles
[NASA-TM-X-64890] N75-12061
Control unit for the control system of a rocket with liquid type engine
[FOA-1-C-1471-D3] N75-12068

LIQUID SODIUM
Liquid metal cooling of turbine blades
[RAE-LIB-TRANS-1713] N75-11977

LITERATURE
Methods for analysis of nitrogen monoxide and nitrogen dioxide in the atmosphere and in exhaust gases. A literature search
[FOA-1-C-1469-H3] N75-12454

LITHIUM
Lithium-doped solar cell pilot line fabrication and test programs
[NASA-CR-140843] N75-12433

LITHIUM NIOBATES
Active circuits for integrated optics. Study of a transverse electro-optical effect modulator
[LCR-73-133/R/G.5] N75-12193

LOADS [FORCES]
Reverification of the NAE 100,000-lb deadweight standard force machine
[NRC-14354] N75-12002
Calibration of the DSL 50 ton-force [500 kN] single-lever primary standard of force
[DSL-551] N75-12331
Seminar on load calculations
[REPT-72-6] N75-12372
Analysis and design of composite bonded joints under a dynamic type load
[AD-785433] N75-12375

LOGIC DESIGN
On high level digital system design
[AD-785570] N75-12666
Modular asynchronous control design --- for control logic
[TID-26601] N75-12670

LONG RANGE WEATHER FORECASTING
Methods of calculating the variations in the total flux of radiant energy for purposes of long range forecasting of large scale meteorological fields
N75-12490
Method of integrating the spectral equations of the planetary dynamics of the atmosphere
N75-12491
Long range weather forecasting in Japan
N75-12524

LONG TERM EFFECTS
Changes in physiological functions of monkeys in a reduced gravitation stand
N75-12555
Physiological costs of extended airborne command and control operations --- human performance and sleep deprivation
N75-12603

LOOPS
The effect of protocol on the response time of loop structures for data communications
[CRC-1261] N75-12174

LOW PRESSURE
Stratification phenomena in the positive column of a low pressure oxygen discharge
[AD-783054] N75-12803

LUNAR SHADOW
Lunar particle shadows and boundary layer experiment: Plasma and energetic particles on the Apollo 15 and 16 subsatellites
[NASA-CR-140371] N75-12871

LUNAR SOIL
Temperature dependence of the ferromagnetic resonance linewidth of lunar soils, iron and magnetite precipitates in simulated lunar glasses, and nonspherical metallic iron particles
[CONF-740321-2] N75-12106
Some surface properties of Apollo 17 soils
[CONF-740321-3] N75-12881

M

MACHINE ORIENTED LANGUAGES
Multilevel model for the synthesis of reliable programs --- applications of computer language for program improvement
[UCLA-10-P-14-126] N75-12347
A study of language directed computer design
[CSRG-20] N75-12623

MAGNESIUM ALLOYS
Combustion mechanism of particles of aluminum-magnesium alloys
[AD-785205] N75-12110
Observations on the stress corrosion cracking of an Al-5 percent Zn-2.5 percent Mg ternary and various quarternary alloys
[AD-785020] N75-12142

MAGNETIC CIRCUITS
Measurement of axial and radial stiffness --- momentum wheel magnetic bearings
N75-12043

MAGNETIC DIPOLES
Investigation on the plasma jet - Dipolar magnetic field interaction
N75-12786

MAGNETIC DISKS
LECO: A compacting and editing program
[FOA-P-C-8353-M3[E5]] N75-12634

MAGNETIC DOMAINS
Characterization and evaluation of materials for magnetic domain propagation [orthoferrites, garnets]
[REPT-8562] N75-12194
The relationship between solar flares and solar sector boundaries
[NASA-CR-140856] N75-12882

MAGNETIC FIELDS
Principles of an axisymmetric MPD-accelerator with external magnetic field
N75-12785
Dynamic of the current sheath in a pulsed coaxial injector
[AD-785115] N75-12809
Intermediate state in superconductors
[AD-785484] N75-12825

MAGNETIC MEASUREMENT
Application of stable nitroxide free radicals in solution to low magnetic field measurements
[CEA-R-4540] N75-12707

MAGNETIC PERMEABILITY
Transmission models for microwave microelectronics using thin films on ferrimagnetic substrates
[REPT-1230/73-143] N75-12192

MAGNETIC PROPERTIES
Transport optical and magnetic properties of solids
[AD-785429] N75-12710
Surface and bulk electronic properties of magnetic materials --- such as pure and impure insulators
[AD-785426] N75-12824

MAGNETIC RELAXATION
Study of molecular dynamics in nematic and isotropic phases of liquid crystals
[CEA-R-4492] N75-12099

MAGNETIC RESONANCE
Application of the least square method to magnetic resonance techniques
[CEA-R-4511] N75-12346

MAGNETIC STORMS
Features of polar cusp electron precipitation associated with a large magnetic storm
[NASA-TM-X-70792] N75-12873

MAGNETIC SUSPENSION
Design and development of a momentum wheel with a mainly passive magnetic bearing, phase 1. Volume 2: Annexes --- momentum wheel with magnetic bearings
[ESRO-CR[P]-506] N75-12041
Momentum wheel - magnetic suspension losses by Eddy currents --- for samarium cobalt magnets
N75-12042
Measurement of axial and radial stiffness --- momentum wheel magnetic bearings
N75-12043
Ratio of axial and radial stiffness in an axisymmetric magnetic bearing
N75-12044
Study of repulsion bearings --- ratio of axial and radial stiffness
N75-12045
Calculations on an elementary fluid damper --- magnetic bearing supports
N75-12046
Principle of systems with Foucault current dissipation --- magnetic bearings damping
N75-12050
Test apparatus for motor and magnetic bearing
N75-12051
Study of the axial actuator --- magnetic bearing axial and radial stiffness
N75-12053

MAGNETIC TRANSDUCERS
Comparison of a cube-textured-nickel and a nickel-200 magnetostrictive ring transducer
[AD-785012] N75-12215

MAGNETO-OPTICS
Power requirements for magneto-optic modulation devices, a theoretical study
[AD-784977] N75-12772

MAGNETOACOUSTIC WAVES
Possibility of heating TFR plasmas by the absorption of fast magnetohydrodynamic waves
[EUR-CEA-FC-711] N75-12793

MAGNETOHYDRODYNAMIC FLOW
The influence of heat treatment on a magnetogasdynamic flow
N75-12783
The Pitot pressure in magnetogasdynamic flows
N75-12787
Aspects of plasmadynamic lasers: High outputs at short wavelengths
N75-12790

MAGNETOHYDRODYNAMIC GENERATORS
Pulsed electromagnetic gas acceleration
[NASA-CR-140996] N75-12775
Plasma accelerators
[AD-785108] N75-12806
MHD energy conversion
[AD-785419] N75-12807

MAGNETOHYDRODYNAMIC STABILITY
Investigations in plasma dynamics --- plasma instabilities
[COO-3004-6] N75-12798
Investigations of plasma instabilities
[AD-784967] N75-12808

MAGNETOHYDRODYNAMIC WAVES
A proposal to study polarizations for hydromagnetic waves observed at ATS-1 --- using magnetometer
[NASA-CR-140857] N75-12464
On the interaction of hydromagnetic waves with earth's magnetosphere in a quasi-hydrodynamics approximation
N75-12776
Hydromagnetic wave propagation in a three-dimensional Magnetosphere, 2
N75-12777
Microscale Alfven waves in the solar wind at 1 AU
[NASA-TM-X-70793] N75-12874

MAGNETOHYDRODYNAMICS
Magnetofluiddynamics --- conference
[DLR-MITT-74-20] N75-12779
Is MHD dead? --- in terms of its uses in energy conversion and combustion technology
N75-12780
MHD energy conversion
[AD-785419] N75-12807

MAGNETOMETERS
Application of stable nitroxide free radicals in solution to low magnetic field measurements
[CEA-R-4540] N75-12707
On the use of Godhavn H-component as an indicator of the interplanetary sector polarity
[NASA-CR-140858] N75-12867

MAGNETOSPHERE
Phase A conceptual design study of the Atmospheric, Magnetospheric and Plasmas in Space [AMPS] payload
[NASA-TM-X-64895] N75-12014
ULF measurements --- stimulation of ULF signals in magnetosphere
[AD-785482] N75-12714
On the interaction of hydromagnetic waves with earth's magnetosphere in a quasi-hydrodynamics approximation
N75-12776
Hydromagnetic wave propagation in a three-dimensional Magnetosphere, 2
N75-12777

MAGNETOSTRICTION
Comparison of a cube-textured-nickel and a nickel-200 magnetostrictive ring transducer
[AD-785012] N75-12215

MAGNETS
Momentum wheel - magnetic suspension losses by Eddy currents --- for samarium cobalt magnets N75-12042
Research in the production of rare-earth-cobalt permanent magnet material by sputter deposition [AD-785358] N75-12166

MAGNUS EFFECT
Experimental magnus characteristics of several ballistic projectiles with various boattail angles and lengths at Mach numbers 1.5, 2.0, and 1.5 [AD-785346] N75-11908

MAINTENANCE
Computer generated troubleshooting trees: The program [AD-785139] N75-12350

MAN MACHINE SYSTEMS
Man as a precious resource: The enhancement of human effectiveness in air transport operations [AD-785368] N75-12620

MANAGEMENT METHODS
An exploration into the practices of DCAS industrial specialists in obtaining contractor production information on high priority, medium value contracts [AD-785441] N75-12854

MANAGEMENT PLANNING
An advanced air traffic management concept based on extensions of the upgraded third generation ATC system [AD-785023] N75-11919
An advanced air traffic management concept based on extensions of the upgraded third generation ATC system. System B: ATC automation analysis [AD-785312] N75-11923
An advanced air traffic management concept based on extensions of the upgraded third generation ATC system. System B: System cost analysis [AD-785313] N75-11924
An advanced air traffic management concept based on extensions of the upgraded third generation ATC system. System B: 1995 Los Angeles Basin traffic model, volume 1 [AD-785309] N75-11926
An advanced air traffic management concept based on extensions of the upgraded third generation ATC system. System B: 1995 Los Angeles Basin traffic model, volume 2 [AD-785310] N75-11927
An advanced air traffic management concept based on extensions of the upgraded third generation ATC system. System B: Air traffic activity projections for 1995 [AD-785308] N75-11928
AAFE man-made noise experiment project. Volume 3: Appendices [NASA-CR-132511] N75-12170
Project Independence: A summary N75-12427
Project Independence N75-12428
Description of some experimental methods with adaptive planning [FOA-P-C-8339-M3] N75-12853

MANAGEMENT SYSTEMS
Introduction to LECO [FOA-P-C-8355-M3[E5]] N75-12635
Personnel management --- bibliography [AD-785350] N75-12846

MANGANESE
Structure and mechanical properties of Cu-Mn-Al alloy [LBL-2598] N75-12133

MANGANESE ALLOYS
The resistance to embrittlement by a hydrogen environment of selected high strength iron-manganese base alloys [NASA-CR-140956] N75-12116
Study on development of high Mn austenitic heat resisting steel: Choice of base composition and the effect of small additions of Ti and Nb [NASA-TT-F-16043] N75-12117

MANIPULATORS
Orthotic arm joint --- for use in mechanical arms [NASA-CASE-MFS-21611-1] N75-12616

MANNED ORBITAL LABORATORIES
Results of induced atmospheric measurements from the Apollo program --- possible effects of the induced environment in the vicinity of manned spacecraft on future manned laboratory experiments [NASA-TN-D-7854] N75-12875

MANNED SPACECRAFT
Optimization of time variable thickness of radiation protection against solar flare protons --- manned spacecraft shielding N75-12567

MANUAL CONTROL
Rolamite rolling-gate valves --- evaluation of design and manual operation [AD-785229] N75-12340

MANUFACTURING
Manufacturing methods technology [MM and T] for ballistically tolerant replacement flight control components [AD-785582] N75-12082

MAPPING
Correlation of missions 191, 51M and helicopter photography --- aerial photography and mapping of three areas in Test Site 175 in Texas [NASA-CR-134289] N75-12279
Sample test reports for camera, still picture, KA-91B --- performance tests of camera for aerial reconnaissance [AD-785399] N75-12294
Leveling of elevations in blocks compiled from flight-line nets in phototriangulation [AD-783830] N75-12426

MARINE BIOLOGY
Mathematical model describing the influence of biological and physical processes on the biological conditions in a sea [PT-1972:5] N75-12538

MARINE TECHNOLOGY
Advanced marine technology [AD-784420] N75-12543

MARINER 5 SPACE PROBE
Directional discontinuities from Mariner 5 and solar wind structure [NASA-TM-X-70733] N75-12884

MARKET RESEARCH
Improved [ERTS] information and its impact on U.S. markets for agricultural commodities: A quantitiative economic investigation of production, distribution and net export effects [NASA-CR-141044] N75-12424

MARS ATMOSPHERE
Mars penetrator: Subsurface science mission [NASA-CR-137587] N75-12878

MARS LANDING
Mars penetrator: Subsurface science mission [NASA-CR-137587] N75-12878

MARS SURFACE
Mars penetrator: Subsurface science mission [NASA-CR-137587] N75-12878

MARSHLANDS
Calculating the depth of the freezing of swamps of the flat bog type in the example of the Tarman bog N75-12522

MARTENSITIC STAINLESS STEELS
Tough cryogenic alloys from the Fe-Mn and Fe-Mn-Cr systems [NASA-CR-134688] N75-12120

MASS
Changes in mass of biological cells when irradiated with Q-pulsed ruby laser [FOA-2-C-2586-E6] N75-12578

MASS SPECTRA
Energy distributions of ions from a pulsed vacuum arc [SLA-74-5034] N75-12795

MASS SPECTROMETERS
Vaporization kinetics and thermodynamics of graphite using the high pressure mass spectrometer [AD-785136] N75-12113

MASS SPECTROSCOPY
Formation of mixed molecular clusters in free-jet expansions --- air pollution from jet engine exhaust gases [AD-785347] N75-12112
Airborne vapor surveillance system [AD-785585] N75-12459
Mass and energy dependence of secondary electron emission from metals, studied for ions in 22 elements from lithium to lead N75-12811

MATERIALS HANDLING
Technology and community development materials processing, and electrical and nuclear technology --- technical research center of Finland N75-12695

MATHEMATICAL MODELS
Mathematical models for some problems in water conservation [PT-1972:7] N75-12387
Analytical modeling of thermal discharges. A review of the state of the art [ANL/ES-18] N75-12456
Numerical models for precipitation scavenging [COO-1407-52] N75-12474
Mathematical model describing the influence of biological and physical processes on the biological conditions in a sea [PT-1972:5] N75-12538
Mathematical modeling of Donnan dialysis; a continuous ion exchange membrane process [SRO-810-1] N75-12547
Mathematical modelling and identification theory [AD-785425] N75-12687
Time series model for texture synthesis [TID-26599] N75-12692

MAXWELL EQUATION
Lamp code users guide --- numerical analysis of laser outputs in either active or passive host media [UCID-16525] N75-12310

MEASURING INSTRUMENTS
Inaccuracy in measurements and calibrations [FOA-3-C-3734-E8] N75-12206
A relaxometer for polymer material [FOA-4-C-4533-G2] N75-12287
Measurement, testing, and safety technology: A compilation [NASA-SP-5976[01]] N75-12343
Method of measuring areas by a curvometer --- hydrographic areas from topographic maps N75-12504
Simplified method of measuring the length of highly sinuous rivers N75-12505

MECHANICAL DEVICES
Analysis of the working process of a free piston expander N75-12240

MECHANICAL DRIVES
Design and development testing of free planet transmission concept [AD-782857/7] N75-12338

MECHANICAL PROPERTIES
Development of stretch fabric for parachute canopies [AD-785195] N75-11902
The alpha-beta titanium alloys. A comparison of the heat treatment and properties of the alloys: Ti-6Al-4V, Ti-6Al-6V-2Sn and Ti-6Al-6V-2Sn-6Zr [RAE-LIB-TRANS-1797] N75-12123
Structure and mechanical properties of Cu-Mn-Al alloy [LBL-2598] N75-12133
Thin-walled beam theory generalized to include thermal effects and arbitrary twist angle [CRC-1253] N75-12363

MEDICAL EQUIPMENT
Aircraft accident medical investigator's kit [AD-785389] N75-12583

MEDITERRANEAN SEA
Climatological elements of the coasts of Metropolitan France [Mediterranean] --- wind, sea state, viability, temperature [MONO-93-VOL-3] N75-12486

MEMBRANES
Osmosis and ion transport in charged porous membranes: A macroscopic, mechanistic model --- analysis of continuum flow in charged, macroscopic pores through a charged membrane [PUBL-74-6] N75-12242

MERCURY [METAL]
Determination of mercury by controlled potential coulometry: An outlay for automatic performance [EUR-5125] N75-12183

MESOSPHERE
Relation of the wind and baric fields in the stratosphere and the lower mesosphere of the tropical zone of the Northern Hemisphere N75-12491
Atmospheric processes in the 30-60 km layer in 1971 - 1973 N75-12494

MESSAGES
Signal processing [CEA-CONF-2584] N75-12180

METABOLISM
Automated analysis of oxidative metabolites [NASA-CASE-ARC-10469-1] N75-12086

METAL BONDING
Characterization of exothermic brazing components Skylab experiment M552 [NASA-CR-120518] N75-12015

METAL CUTTING
Fabrication technology: A compilation --- cutting and working with metals [NASA-SP-5978[02]] N75-12162

METAL FATIGUE
Effects of microstructural modification on titanium toughness and fatigue [AD-785409] N75-12139

METAL HYDRIDES
Metal hydrides as hydrogen storage media [BNL-18887] N75-12440

METAL IONS
Mass and energy dependence of secondary electron emission from metals, studied for ions in 22 elements from lithium to lead N75-12811

METAL JOINTS
Investigations into the creep and ageing behaviour of glued metal joints [RAE-LIB-TRANS-1793] N75-12365
Calculation of incipient fracture at a shrink-fit pin interference [SLL-73-63] N75-12367

METAL MATRIX COMPOSITES
Calculation of incipient fracture at a shrink-fit pin interference [SLL-73-63] N75-12367

METAL OXIDES
Method of sampling particles formed during burning of metallized condensed systems in constant-pressure chamber [AD-785212] N75-12114
Metal oxidation laser [AD-784760] N75-12312

METAL PARTICLES
Far infrared absorption in small metallic particles [COO-3151-38] N75-12798

METAL POWDER
Combustion mechanism of particles of aluminum-magnesium alloys
[AD-785205] N75-12110
METAL SHEETS
Method of making an explosively welded scarf joint
[NASA-CASE-LAR-11211-1] N75-12326
METAL SHELLS
Examination of an object from space
[FOA-1-A-1562-F5] N75-12023
METAL SURFACES
Erosive destruction by cavitation flow
N75-12237
METAL WORKING
Fabrication technology: A compilation --- cutting and working with metals
[NASA-SP-5978[02]] N75-12162
METAL-METAL BONDING
Nondestructive tests of regenerative chambers --- evaluating nondestructive methods of determining metal bond integrity
[NASA-CR-134656] N75-12058
Nondestructive tests of regenerative chambers, appendix --- evaluating nondestructive methods of determining metal bond integrity
[NASA-CR-134657] N75-12059
METAL-NITRIDE-OXIDE-SILICON
Design and fabrication of a versatile testing system for MNOS
[AD-785131] N75-12221
METALS
Report on attendance at Arbeitstagung: Gase in Metallen at Darmstadt and visits to August-Thyssen-Hutte AG at Duisburg and the Max Planck Institute at Stuttgart, March 1972
[FOA-4-C-4519-F3] N75-12126
Fifth International Congress on Metal Corrosion
[FOA-1-C-1493-G3[G1]] N75-12129
AC electronic tunneling at optical frequencies
[NASA-CR-140802] N75-12812
METEOROLOGICAL CHARTS
Computer treatment of climatic research data: Table type A
[FOA-1-C-1503-M4[H5-H6]] N75-12530
METEOROLOGICAL INSTRUMENTS
Systems study of an automated fire weather data system
[NASA-TM-X-62402] N75-12277
METEOROLOGICAL PARAMETERS
Atmospheric attenuation of aircraft noise. Experimental valves measured in a range of climatic conditions, volume 1
[HSA-HAD-R-GEN-214-VOL-1] N75-11979
Atmospheric attenuation of aircraft noise. Experimental valves measured in a range of climatic conditions, volume 2
[HSA-HAD-R-GEN-214-VOL-2] N75-11980
Measurements of the basic atmospheric parameters at Woomera using the falling sphere, August to November 1973
[WRE-TN-1246[WR-D]] N75-12466
Climatological elements of the coasts of Metropolitan France [Atlantic] --- wind, sea state, visibility, temperature
[MONO-93-VOL-2] N75-12484
Climatological elements of the coasts of Metropolitan France [North Sea, Channel] --- wind, sea state, visibility, temperature
[MONO-93-VOL-1] N75-12485
Climatological elements of the coasts of Metropolitan France [Mediterranean] --- wind, sea state, visibility, temperature
[MONO-93-VOL-3] N75-12486
Methods of calculating the variations in the total flux of radiant energy for purposes of long range forecasting of large scale meteorological fields
N75-12490
Method of integrating the spectral equations of the planetary dynamics of the atmosphere
N75-12491
Optimal time assimulation of satellite measurement data for statistical analysis of meteorological fields
N75-12492
Future climate --- effects of modern economic activity
N75-12508
Problem of using asynchronous meteorological data
N75-12510
Causes of the explosive onset and limits of propagation of the summer monsoon in the Indian Ocean
N75-12512
Application of expansions with respect to natural orthogonal components in the studies of drainage --- hydrometeorological factors during spring floods
N75-12517
Long range weather forecasting in Japan
N75-12524
An assessment of warm fog: Nucleation, control, and recommended research
[NASA-CR-2477] N75-12529
Reduction and error analysis of the AVE 2 pilot experiment data
[NASA-CR-120496] N75-12531
METEOROLOGICAL SATELLITES
Development of a Stationary Plasma Motor [SPM] and its testing on the meteor
N75-12066
Optimal time assimulation of satellite measurement data for statistical analysis of meteorological fields
N75-12492
METEOROLOGY
Evapotranspiration: Agrometeorological aspect and evaluation of potential evapotranspiration
[MONO-65] N75-12482
Meteorology and hydrology, no. 8, 1974 --- climatology, agriculture meteorology, weather forecasting, and hydrology
[JPRS-63560] N75-12488
Meteorology and hydrology, no. 9, 1974 --- microclimatology, agricultural meteorology, weather forecasting, climate control, and hydrological forecasting
[JPRS-63569] N75-12507
METHANE
The nu sub 2 band CHD3; ground state parameters for CHD3 from combination differences
[NASA-CR-140861] N75-12088
Surface recrystallization theory of the wear of copper in liquid methane
[NASA-TN-D-7840] N75-12124
METHODOLOGY
Experiment with methodologies for the specification of programming systems
[UCLA-10-P-14-128] N75-12643
MICE
A system of computer programs for recording the activity of mice
[FOA-1-C-1478-M4] N75-12545
Peculiarities in the formation of cataracts in mice after irradiation by 645 MeV protons and Co60 gamma rays
N75-12557
MICHIGAN
Study of recreational land and open space using Skylab imagery --- southeast Michigan
[E75-10034] N75-12404
Developing processing techniques for Skylab data --- Michigan test site
[E75-10040] N75-12409
MICROANALYSIS
M553 sphere forming experiment: Pure nickel specimen evaluation
[NASA-CR-129036] N75-12016
The semimicro determination of potassium chlorate and lead thiocyanate in priming compositions
[DSL-TN-339] N75-12093
A wavelength sorting method for electron probe X-ray microanalysis
[DSL-600] N75-12097
Application of Auger electron spectroscopy to electron probe microanalysis
N75-12290
MICROBIOLOGY
Apparatus for microbiological sampling --- including automatic swabbing
[NASA-CASE-LAR-11069-1] N75-12272
MICROELECTRONICS
Transmission models for microwave microelectronics using thin films on ferrimagnetic substrates
[REPT-1230/73-143] N75-12192
Development for application of parylene coatings --- to hybrid microcircuits devices
[NASA-CR-120536] N75-12208
Soldering large area joints in vacuum
[SLA-73-1075] N75-12335
MICROMETEOROIDS
Theoretical investigations on the coaxial accelerator with compression coil --- for the simulation of micrometeorides
N75-12782
MICROORGANISMS
Environmental microbiology as related to planetary quarantine --- synergetic effect of heat and radiation
[NASA-CR-140941] N75-12622
MICROROCKET ENGINES
The conception and realisation of sub-assemblies for the temperature control of a microthruster. Optimisation by development of a mathematical model
[RAE-LIB-TRANS-1757] N75-12067
MICROSTRUCTURE
Examination of an object from space
[FOA-1-A-1562-F5] N75-12023
Effects of microstructural modification on titanium toughness and fatigue
[AD-785409] N75-12139
Properties and structure of some ceramics used for, or adapted for, lightweight armour
[FOA-4-C-4532-D6] N75-12148
General physical characteristics of mists
[MONO-92] N75-12483
MICROTHRUST
The conception and realisation of sub-assemblies for the temperature control of a microthruster. Optimisation by development of a mathematical model
[RAE-LIB-TRANS-1757] N75-12067
MICROWAVE EMISSION
A balloon-borne 1 meter telescope for far-infrared astronomy
N75-12740
MICROWAVE EQUIPMENT
Development of microwave landing system implementation criteria
[AD-785220] N75-12005
Development of solid-state microwave electronics
N75-12838
Development of microwave semiconductors
N75-12840
MICROWAVE LANDING SYSTEMS
Consideration of near field effects in Microwave Landing System [MLS] feasibility evaluation
[AD-784854] N75-12004
MICROWAVE OSCILLATORS
Investigation of the physical origins of noise in Avalanche and Gunn oscillators and noise reduction techniques
[AD-780935/3] N75-12217
MICROWAVE SPECTRA
Microwave and infrared observations of molecular spectra in Comet Kohoutek
[NASA-CR-140955] N75-12865
MIGRATION
Radar studies of bird migration
[NASA-CR-139802] N75-12544
MILITARY AIR FACILITIES
Community noise exposure resulting from aircraft operations: Computer program operation's manual
[AD-785360] N75-11989
MILITARY AIRCRAFT
An advanced air traffic management concept based on extensions of the upgraded third generation ATC system. System B: Air traffic activity projections for 1995
[AD-785308] N75-11928
The painting of military aircraft
[DSL-TN-345] N75-12147
MILITARY TECHNOLOGY
Engineering design handbook: Environmental series. Part one: Basic environmental concepts
[AD-784999] N75-12461
United States Navy physiological telemetry system operation and maintenance manual --- for conveying heart rate and core temperature
[AD-785273] N75-12619
Bibliography of bibliographies in the DDC collection
[AD-780700/1] N75-12851
MILLIMETER WAVES
Review of current radar interests and extending the radar spectrum to the HF and the milimeter wave bands
[AD-785007] N75-12190
MINERAL DEPOSITS
Geotechnological methods for mineral production --- in the U.S.S.R.
[JPRS-63469] N75-12386
An interdisciplinary analysis of multispectral satellite data for selected cover types in the Colorado Mountains, using automatic data processing techniques --- hydrology, ecology, geology, vegetation, and mineral deposits
[E75-10002] N75-12390
Geologic and mineral and water resources investigations in Western Colorado, using Skylab EREP data --- Utah
[E75-10043] N75-12412
MINERALS
Remote sensing geophysics from Skylab --- Southern California and Nevada minerals and rocks
[E75-10045] N75-12413
MINES [EXCAVATIONS]
Geotechnological methods for mineral production --- in the U.S.S.R.
[JPRS-63469] N75-12386
Rate of formation and dissipation of smog in open industrial quarries
N75-12515
MINICOMPUTERS
Design of a secure data transmission system: An implementation of communication theory using a microcomputer
[UCRL-51587] N75-12625
Input-output interfaces for the D17B bus-structured I/O system
[AD-785128] N75-12627
MINNESOTA
A study of Minnesota forests and lakes using data from Earth Resources Technology Satellites
[NASA-CR-140865] N75-12421
MINORITY CARRIERS
Method for determining minority carrier life in epitaxial silscon layers summary --- laser measurements
N75-12090
MIRRORS
Strain gauge ambiguity sensor for segmented mirror active optical system
[NASA-CASE-MFS-20506-1] N75-12273
MIS [SEMICONDUCTORS]
Electrical conduction through thermal and anodic oxides of indium antimonide
[AD-785078] N75-12819
MISSILE CONTROL
Homing, chapter 6 --- radio control and command for missiles
N75-12173

A flight simulator study of missile control performance as a function of concurrent workload --- task complexity effects
N75-12592

MISSILE SILOS
Comparison of the results of the dynamic response of cylindrical shells by finite element methods: Axisymmetric case
[AD-785258] N75-12381

MISSILE TESTS
Comparison of the theoretical errors in the simultaneous measurement of round trip delay and Doppler frequency for several radar waveforms
[SLA-74-30] N75-12179
Analysis of delivery accuracy for AH-1G [Cobra] launched 2.75-inch rockets from tests conducted January - March 1972 at China Lake, California
[AD-782978] N75-12891

MISSILE TRAJECTORIES
Comparison of the theoretical errors in the simultaneous measurement of round trip delay and Doppler frequency for several radar waveforms
[SLA-74-30] N75-12179

MISSION PLANNING
Mission design for a ballistic slow flyby Comet Encke 1980
[NASA-TN-D-7726] N75-12012
Phase A conceptual design study of the Atmospheric, Magnetospheric and Plasmas in Space [AMPS] payload
[NASA-TM-X-64895] N75-12014
Skylab mission planning support through the use of a hybrid simulation
[NASA-TM-X-64889] N75-12037
AAFE man-made noise experiment project. Volume 2: Project and experiment discussions
[NASA-CR-132510] N75-12169
Aircrew workload and human performance: The problem facing the operational commander --- human component in air weapons system
N75-12595
Mars penetrator: Subsurface science mission
[NASA-CR-137587] N75-12878

MIST
General physical characteristics of mists
[MONO-92] N75-12483

MIXING CIRCUITS
Possibilities for the construction of various types of multi-value adders from mixers, switches, and spectrotrons
[AD-781323/1] N75-12626

MOISTURE CONTENT
Detection of moisture and moisture related phenomena from Skylab --- Kansas, Oklahoma, and Arkansas
[E75-10035] N75-12405

MOLDING MATERIALS
Molding of oriented short-fiber composites. 4: Characterization of fiber orientation patterns
[AD-785266] N75-12084

MOLECULAR BEAMS
Dynamic molecular deflection
[AD-785407] N75-12718

MOLECULAR RELAXATION
Rotational relaxation measurements and resonant phenomena in laser-excited hydrogen fluoride
[AD-784952] N75-12321

MOLECULAR ROTATION
Rotational relaxation measurements and resonant phenomena in laser-excited hydrogen fluoride
[AD-784952] N75-12321
Dynamic molecular deflection
[AD-785407] N75-12718

MOLECULAR SPECTRA
Microwave and infrared observations of molecular spectra in Comet Kohoutek
[NASA-CR-140955] N75-12865

MOLECULAR STRUCTURE
Fundamental studies in isotope chemistry --- relationship between isotope effects and molecular and intermolecular forces
[COO-3498-15] N75-12075

MONGOLIA
Lakes of Mongolia
N75-12525

MONITORS
Development of a battery status monitor
[NASA-CR-140362] N75-12278

MONKEYS
Changes in physiological functions of monkeys in a reduced gravitation stand
N75-12555

MONOCHROMATORS
Studies of monochromatic, quasi-monochromatic and broadband imaging techniques: A generalized imaging integral
[AD-785269] N75-12770

MONSOONS
Causes of the explosive onset and limits of propagation of the summer monsoon in the Indian Ocean
N75-12512

MONTE CARLO METHOD
Bell transform --- important to certain Monte Carlo method
[LA-UR-74-831] N75-12686

MOSSBAUER EFFECT
Studies on non-crystalline iron halogenid layers by application of Mossbauer spectroscopy
N75-12119

MUD
Technogenic-glacial mud and rock flow in the Khibin mountain mass
N75-12521

MULTIPATH TRANSMISSION
The design of multiple access frequency hopping patterns
[AD-785381] N75-12183

MULTIPHASE FLOW
Measurements of gas component and duration time in the liquid phase of two and three component systems in bubble column reactors --- for aerobic fermentation
N75-12285

MULTIPLE OUTPUT PROGRAMS
Multi-computer multiple data path hardware exchange system
[NASA-CASE-NPO-13422-1] N75-12652

MULTIPROGRAMMING
Introduction to RATS [RISOS/ARPA Terminal System]: An operating system for the DEC PDP-11/45
[UCRL-51582] N75-12662

MULTISPECTRAL BAND SCANNERS
Quantitative determination of stratospheric aerosol characteristics
[E75-10010] N75-12393
Develop techniques and procedures, using multispectral systems, to identify from remotely sensed data the physical and thermal characteristics of plants and soil --- Southern Texas
[E75-10012] N75-12394
A cloud physics investigation utilizing Skylab data
[E75-10021] N75-12400
Experimental evaluation of atmospheric effects on radiometric measurements using the EREP of Skylab --- Bonneville Salt Flats, Utah
[E75-10036] N75-12406
Developing processing techniques for Skylab data --- Michigan test site
[E75-10040] N75-12409
New theoretical models and ratio imaging techniques associated with the NASA earth resources spectral information system
[NASA-CR-140357] N75-12417
Correlation and registration of ERTS multispectral imagery --- by a digital processing technique
[NASA-CR-134294] N75-12420

MULTISPECTRAL PHOTOGRAPHY
Study of atmospheric effects in Skylab data
[E75-10006] N75-12391
Experiment to evaluate feasibility of utilizing Skylab-EREP remote sensing data of tectonic analysis of the Bighorn Mountains region, Wyoming-Montana --- Black Hills, South Dakota/Wyoming
[E75-10014] N75-12395
Evaluation of Skylab imagery as an information service for investigating land use and natural resources
[E75-10018] N75-12397
Study of recreational land and open space using Skylab imagery
[E75-10020] N75-12399
A Skylab program for the International Hydrological Decade [IHD] --- Lake Ontario Basin
[E75-10039] N75-12408
Index of Skylab data available at Colorado School of Mines --- multispectral photography of Colorado
[E75-10041] N75-12410
In situ spectroradiometric calibration of EREP imagery and oceanography of Block Island Sound --- Arizona geology
[E75-10042] N75-12411
A study of the usefulness of Skylab EREP data for earth resources studies in Australia --- Australia geology
[E75-10047] N75-12415

MUTATIONS
Molecular basis for the mutagenic and lethal effects of ultraviolet irradiation
[COO-3232-3] N75-12548

MYOCARDIAL INFARCTION
ECG changes in the MX, DS and MC leads in cases of focal and diffuse damage to the cardiac muscle
N75-12570

N

NACELLES
Theoretical prediction of thick wing and pylon-fuselage-fanpod-nacelle aerodynamic characteristics at subcritical speeds. Part 1: Theory and results
[NASA-CR-137578] N75-11935
Theoretical prediction of thick wing and pylon-fuselage-fanpod-nacelle aerodynamic characteristics at subcritical speeds. Part 2: Computer program description
[NASA-CR-137579] N75-11936
Effects of the air breathing engine plumes on SSV orbiter subsonic wing pressure distributions [OA57A]
[NASA-CR-134414] N75-12040

NAVIER-STOKES EQUATION
Numerical and experimental studies of the natural convection within a horizontal cylinder
[NASA-TN-D-7728] N75-12241
Third International Conference on Numerical Methods in Fluid Dynamics
[FOA-4-C-4518-A2] N75-12249

NAVIGATION AIDS
Modified post-flight processor for CIRIS
[AD-785370] N75-11916

NEAR FIELDS
Consideration of near field effects in Microwave Landing System [MLS] feasibility evaluation
[AD-784854] N75-12004

NEAR INFRARED RADIATION
An examination of whiteouts and transmission through ice fog in the visible and near infrared
[DREO-TN-74-18] N75-12467

NEON
Study of the neon-oxygen laser under heavy particle bombardment
[COO-2007-45] N75-12306

NETWORK ANALYSIS
Some new algorithms for deterministic and probabilistic communication networks
[AD-785119] N75-12184
Investigations of plasma dielectric functions --- analysis from electric network theory
[RISO-301] N75-12796

NETWORK SYNTHESIS
Ganged series potentiometer mixer networks
[NASA-CR-140850] N75-12209
Coordination of critical access to distributed databanks in computer networks based on decentralized control
[KFK-1967] N75-12663
Interface message processors for the ARPA computer network
[AD-784951] N75-12665

NEURONS
Neurophysiological aspects of interaction of the vestibular system with other body sensory systems
N75-12553

NEUROPHYSIOLOGY
Model of human dynamic orientation --- associated with vestibular stimuli
[NASA-CR-132537] N75-12585

NEUTRAL PARTICLES
Absence of strangeness-changing, neutral current effects from the symmetric quark model
N75-12813

NEUTRON IRRADIATION
The effect of neutron irradiation on the structure and mechanical properties of carbon fibres
[ARL/MET-REPT-93] N75-12078

NEVADA
Remote sensing geophysics from Skylab --- Southern California and Nevada minerals and rocks
[E75-10045] N75-12413

NICKEL
M553 sphere forming experiment: Pure nickel specimen evaluation
[NASA-CR-129036] N75-12016
Comparison of a cube-textured-nickel and a nickel-200 magnetostrictive ring transducer
[AD-785012] N75-12215

NICKEL ALLOYS
Investigation of solidification in zero-gravity environment: M553 sphere forming experiment. Nickel-silver alloy evaluation
[NASA-CR-129034] N75-12017
The characterization of the reversion stress for NiTi
[AD-784761] N75-12373
Dispersion-strengthened metal fin structural test
[AD-785374] N75-12378

NICKEL COMPOUNDS
Hydrogen solubility in 1:5 compounds between Y or Th and Ni or Co
[COO-3429-19] N75-12076

NIGHT
The E region of this ionosphere at night time: A literature study
[FOA-3-C-3731-E1] N75-12472

NIGHT VISION
Review of an amplifier tube for pictures at low light levels
[FOA-2-C-2585-E1-E3] N75-12389

NIOBIUM
Study on development of high Mn austenitic heat resisting steel: Choice of base composition and the effect of small additions of Ti and Nb
[NASA-TT-F-16043] N75-12117
Electronic structure of hard superconductors --- establishment of cleaning procedures of niobium
[AD-785421] N75-12821

NIOBIUM ALLOYS
Hardness behavior of binary and ternary niobium alloys at 77 and 300 K
[NASA-TN-D-7847] N75-12127
A high resolution electron microscope study of the omega transformation in Zr-N 0b alloys
[AD-785267] N75-12137
Modification and control of oxides structures on metals and alloys [phase 4] --- specifically niobium alloys
[AD-785261] N75-12143

Superconducting properties of bulk and thin film A15 compounds
[AD-785014] N75-12818

NIOBIUM COMPOUNDS
High pressure differential thermal analysis experiments with the LaNi5-H system
[SLA-74-5322] N75-12101

NITROGEN
Studies on N2 fixation in transition metal complexes of chromium, molybdenum, and tungsten
N75-12118

NITROGEN OXIDES
Application of stable nitroxide free radicals in solution to low magnetic field measurements
[CEA-R-4540] N75-12707

NITROUS OXIDES
Methods for analysis of nitrogen monoxide and nitrogen dioxide in the atmosphere and in exhaust gases. A literature search
[FOA-1-C-1469-H3] N75-12454

NOISE MEASUREMENT
Atmospheric attenuation of aircraft noise. Experimental valves measured in a range of climatic conditions, volume 1
[HSA-HAD-R-GEN-214-VOL-1] N75-11979
Atmospheric attenuation of aircraft noise. Experimental valves measured in a range of climatic conditions, volume 2
[HSA-HAD-R-GEN-214-VOL-2] N75-11980

NOISE REDUCTION
Parametric study of STOL short-haul engine cycles and operational techniques to minimize community noise impact
[NASA-CR-2486] N75-11910
Investigations into aircraft noise reduction by shielding --- europlane QTOL design concept
N75-11949
Some results of aeroacoustic research --- effect of shrouded nozzle configurations on jet noise
N75-11950
Noise of jets which are impinging on obstacles [for examples externally blown flaps] and possibilities of noise attenuation
N75-11951
Aircraft noise abatement
[GPO-41-298] N75-11969
Effect of treated length on performance of full scale turbofan inlet noise suppressors
[NASA-TN-D-7826] N75-11978
Acoustic attenuation design requirements established through EPNL parametric trades
[NASA-CR-120986] N75-11985
In-airframe ground runup noise suppressor program
[AD-785246] N75-11986
Small turbine engine noise reduction. Volume 5: Data tabulations
[AD-780576/5] N75-11988
Analysis of an impulse noise suppressor for FM demodulators
[NASA-CR-120492] N75-12198
Investigation of the physical origins of noise in Avalanche and Gunn oscillators and noise reduction techniques
[AD-780935/3] N75-12217

NONDESTRUCTIVE TESTS
Use of cholesteric liquid crystals for locating voids in adhesively bonded helicopter rotor blades
[AD-785502] N75-11963
Nondestructive tests of regenerative chambers --- evaluating nondestructive methods of determining metal bond integrity
[NASA-CR-134656] N75-12058
Nondestructive tests of regenerative chambers, appendix --- evaluating nondestructive methods of determining metal bond integrity
[NASA-CR-134657] N75-12059
Improved hot-wire electroexplosive devices --- testing concepts for improving initiation safety
[LA-UR-74-743] N75-12157
Data acquisition and processing system for ultrasonic research
[AD-785127] N75-12852

NONEQUILIBRIUM PLASMAS
Electromagnetic fluctuations in the half-space of nonequilibrium plasma
[ITF-74-23P] N75-12799
Transition probabilities, correlation functions and dielectric permittivity tensors for semibounded and bounded nonequilibrium plasma
[ITF-74-21E] N75-12800
Supersonic expansion of nonequilibrium plasmas --- of ionized gas
[AD-785434] N75-12804

NONLINEAR EQUATIONS
King's law coefficients computation method for linearization of the constant temperature anemometer
[AAAF-NT-74-2] N75-12274

NONLINEAR SYSTEMS
Time-optimal control synthesis for non-linear systems: A flight dynamic example
[AD-785405] N75-12671
Nonlinear effects: Amplifiers and convolvers
N75-12702

NONLINEARITY
Numerical and analytical investigation of nonlinear properties of the Vlasov equation
[COO-2059-37] N75-12801

NORTH ATLANTIC TREATY ORGANIZATION [NATO]
AGARD index of publications, 1952 - 1970. Part 3: Author index. Part 4: Addendum to Part 1
[AGARD-INDEX-52/70] N75-12847

NORTH SEA
Climatological elements of the coasts of Metropolitan France [North Sea, Channel] --- wind, sea state, visibility, temperature
[MONO-93-VOL-1] N75-12485

NORTHERN HEMISPHERE
Relation of the wind and baric fields in the stratosphere and the lower mesosphere of the tropical zone of the Northern Hemisphere
N75-12493
Atmospheric processes in the 30-60 km layer in 1971 - 1973
N75-12494

NOSE CONES
Pilot model for aero propulsion test sled
[AD-785125] N75-12006
Leeside flow field description over cones at large incidence
[AD-785369] N75-12260

NOTCH TESTS
Contribution to the exact determination of the notch factor in screwed nut joints
N75-12327

NOZZLE FLOW
On the flow near a weak shock wave downstream of a nozzle throat --- numerical analysis of pressure gradient, streamline curvature, and shock wave curvature
[AD-785283] N75-12257

NOZZLES
Stress analysis of a radial nozzle attached to a cylindrical shell under internal pressure
[ORNL-TM-4269] N75-12366

NUCLEAR EXPLOSION EFFECT
Peaceful nuclear explosions and the environment
[JPRS-63502] N75-12719

NUCLEAR EXPLOSIONS
Seismic magnitudes from explosions and earthquakes obtained at the Hagfors and Matsushiro Observatories
[FOA-C-20010-T1] N75-12465

NUCLEAR FUELS
ORNL isotopic power fuels --- emphasizing [Cm-244]2O3
[ORNL-4978] N75-12730

NUCLEAR FUSION
Laser systems for laser fusion
[UCRL-75367] N75-12303
Survey of applications of fusion power technology to the chemical and material processing industry
[BNL-18866] N75-12443
Fusion power by magnetic confinement
[WASH-1290] N75-12797
Nucleosynthesis of light elements in stellar atmospheres and in interstellar matter
N75-12868

NUCLEAR MAGNETIC RESONANCE
Study of molecular dynamics in nematic and isotropic phases of liquid crystals
[CEA-R-4492] N75-12099

NUCLEAR PHYSICS
Technology and community development materials processing, and electrical and nuclear technology --- technical research center of Finland
N75-12695

NUCLEAR POWER PLANTS
Optimization of carbon dioxide gas turbine loops
N75-11975
Field investigations of heated discharges from nuclear power plants on Lake Michigan, 1972
[ANL/ES-32] N75-12457
Estimated quantities of materials contained in a 1000-MW[e] PWR power plant
[ORNL-TM-4515] N75-12721
Nuclear power growth, 1974 - 2000 --- forecasting future reactor technology
[WASH-1139-74] N75-12723

NUCLEAR POWER REACTORS
Fusion power by magnetic confinement
[WASH-1290] N75-12797

NUCLEAR REACTOR CONTROL
Fusion power by magnetic confinement
[WASH-1290] N75-12797

NUCLEAR RESEARCH
Short description of the thermonuclear facilities of the I. V. Kurchatov Institute for Nuclear Energy
[ANL-TRANS-952] N75-12722

NUCLEAR WEAPONS
MC2730 radioisotopic thermoelectric generator: A development report
[SLA-74-46] N75-12446

NUCLEATION
An assessment of warm fog: Nucleation, control, and recommended research
[NASA-CR-2477] N75-12529

NUCLEI [NUCLEAR PHYSICS]
Nucleosynthesis of light elements in stellar atmospheres and in interstellar matter
N75-12868

NUMERICAL ANALYSIS
Numerical methods for the design and analysis of wings at supersonic speeds
[NASA-TN-D-7713] N75-11930
Prime implicant algorithm with factoring
[SLA-74-218] N75-12645
Research study on stabilization and control modern sampled-data control theory. Design of the Large Space Telescope system
[NASA-CR-120534] N75-12669
Obtaining initial vectors for minimizing the probability of misclassification
[NASA-CR-140348] N75-12675
Modified multistep methods for the numerical solution of a class of stiff ordinary differential equations
[FOA-2-C-2570-M4] N75-12677
Numerical and analytical investigation of nonlinear properties of the Vlasov equation
[COO-2059-37] N75-12801

NUTATION
The SAS-D nutation control system
[NASA-TM-X-65944] N75-12039

NUTS [FASTENERS]
Contribution to the exact determination of the notch factor in screwed nut joints
N75-12327

O

OCEAN BOTTOM
Effect of bottom relief on the geostrophic wind currents
N75-12498
Problem of the method of determining the composition of bottom deposits and suspensions --- analysis of sediment fall velocity errors
N75-12520
Advanced marine technology
[AD-784420] N75-12543

OCEAN CURRENTS
An assessment of the potential contributions to oceanography from Skylab visual observations and hand-held photography --- Pacific Ocean, Atlantic Ocean and Gulf of Mexico
[E75-10017] N75-12396
Comparison of the diagnostic and forecasting calculations of currents in the lower part of the Atlantic Ocean
N75-12497
Effect of bottom relief on the geostrophic wind currents
N75-12498
Computation of real-time currents off Southern California with multi-layer hydrodynamical-numerical models
[AD-785245] N75-12541
New England Continental Shelf dynamics pilot experiment
[AD-785257] N75-12542

OCEAN MODELS
Computation of real-time currents off Southern California with multi-layer hydrodynamical-numerical models
[AD-785245] N75-12541

OCEAN SURFACE
Total heat transfer to the atmosphere from the ocean surface in the vicinity of formation of Hurricane Hilda
N75-12516
Marine physics: Internal-surface wave interaction
[AD-785262] N75-12540

OCEANOGRAPHY
A simulation of synthetic aperture radar imaging of ocean waves
[NASA-TM-X-72629] N75-12172
An assessment of the potential contributions to oceanography from Skylab visual observations and hand-held photography --- Pacific Ocean, Atlantic Ocean and Gulf of Mexico
[E75-10017] N75-12396
In situ spectroradiometric calibration of EREP imagery and oceanography of Block Island Sound --- Arizona geology
[E75-10042] N75-12411
Comparison of the diagnostic and forecasting calculations of currents in the lower part of the Atlantic Ocean
N75-12497
Oceanographical observations from Danish light-vessels and coastal stations, 1973
[ISBN-87-7478-097-2] N75-12539

OCEANS
Solar sea thermal energy
[GPO-37-476] N75-12430

OILS
Inhomogeneous oil spark paths at unipolar voltage load
N75-12197

OKLAHOMA
Detection of moisture and moisture related phenomena from Skylab --- Kansas, Oklahoma, and Arkansas
[E75-10035] N75-12405
OMEGA NAVIGATION SYSTEM
Omega flight-test data reduction sequence --- computer programs for reduction of navigation data
[NASA-CR-140827] N75-11911
Low cost omega navigation receiver
[NASA-CR-140853] N75-11912
ON-LINE PROGRAMMING
On-line data acquisition and data processing in a meteorological tower-PDP-8/I-CALAS system coupling
[KFK-1934] N75-12532
ONE DIMENSIONAL FLOW
One-dimensional compressible gas flow in ducts
[ESDU-74028] N75-12223
OPERATIONS RESEARCH
A study of the operation of selected national research facilities
[NASA-CR-140322] N75-12842
OPERATOR PERFORMANCE
Effect of 30-day hypokinesia on the dynamics of higher nervous activity and sleep of an operator
N75-12566
A simulator study to investigate human operator workload
N75-12589
Measurement and estimation procedure for flight safety control operator workload
N75-12609
OPTICAL COMMUNICATION
Communication link with CO2 laser
[FOA-2-C-2584-E2] N75-12176
Airborne Visible Laser Optical Communications [AVLOC] experiment
[NASA-TM-X-64894] N75-12296
Experiment with laser communication
[FOA-2-C-2575-E2] N75-12298
OPTICAL EQUIPMENT
Strain gauge ambiguity sensor for segmented mirror active optical system
[NASA-CASE-MFS-20506-1] N75-12273
Influence of tool feed [IN/REV] on the machinability of CO2 laser optics
[Y-DA-5786] N75-12305
Laser pulse propagation code
[LA-5607-MS] N75-12307
High energy laser windows
[AD-784991] N75-12319
Monolithic laser --- gallium indium arsenide optical transmitter
[AD-785021] N75-12325
OPTICAL MEASURING INSTRUMENTS
On the possibilities of using a laser in transmission equipment for sighting measurements
[FOA-P-C-8362-M7] N75-12297
Optical probing of surface waves
N75-12703
OPTICAL MEMORY [DATA STORAGE]
Investigation of a photodichroic material for holographic storage and recovery
[AD-785274] N75-12768
OPTICAL PROPERTIES
Characterization of self-focusing mechanisms in laser materials
[UCRL-13597] N75-12308
Complex studies of the stratospheric aerosol --- optical properties of aerosols and effects on stratospheric radiation
N75-12509
Transport optical and magnetic properties of solids
[AD-785429] N75-12710
OPTICAL PUMPING
Analysis of VUV and X-ray lasers pumped by a traveling-wave source
[AD-784995] N75-12318
OPTICAL RANGE FINDERS
On the possibilities of using a laser in transmission equipment for sighting measurements
[FOA-P-C-8362-M7] N75-12297
OPTICAL SCANNERS
Holo-scanner technique for wideband recording
[AD-785396] N75-12293
A feasibility study of limb volume measuring systems
[NASA-CR-140330] N75-12580
OPTICAL TRACKING
Visible magnitude of typical satellites in synchronous orbits
[AD-785380] N75-12024
Discrete-time domain analysis of a two-axis beam deflector
[AD-785133] N75-12773
Optical stellar interferometry for satellite surveillance
[AD-784947] N75-12866
OPTIMAL CONTROL
Neighboring optimal guidance theory and computer program
[NASA-CR-140332] N75-12631
Optimal concepts of fire protection as a function of the importance of data processing installations
[LA-TR-74-20] N75-12850
OPTIMIZATION
A method for determining optimum phasing of a multiphase propulsion system for a single-stage vehicle with linearized inert weight
[NASA-TN-D-7792] N75-12063
Optimal design of recursive digital filters
[AD-785571] N75-12216
Optimization of time variable thickness of radiation protection against solar flare protons --- manned spacecraft shielding
N75-12567
Duration of program for program optimization
[FOA-P-C-8350-M3[E5]] N75-12655
X-FOC: A help program for 8-16 K TIROS-FOCAL
[FOA-1-C-1507-C2[C4]] N75-12659
ORBITAL MECHANICS
User's guide to four-body and three-body trajectory optimization programs
[NASA-CR-139136] N75-12020
ORBITAL WORKSHOPS
The final Skylab mission: Man at home and at work in space
[NASA-TM-X-70394] N75-12019
ORGANIC LASERS
Fast expanding carbon plasma jets as laser-active medium?
N75-12789
ORGANIC LIQUIDS
Density and compressibility studies on homologous rows of ethers, ketones, dioles up to 4000 bar and 80 C
N75-12098
ORGANIZATIONS
Empirical findings and suggestions for future research on organizational communication
[AD-785002] N75-12843
ORGANOMETALLIC COMPOUNDS
Studies on N2 fixation in transition metal complexes of chromium, molybdenum, and tungsten
N75-12118
ORIFICE FLOW
Effect of nonsymmetrical flow resistance upon orifice impedance resistance
[NASA-TM-X-72624] N75-12233
OROGRAPHY
Analysis of two cases of significant precipitation observed in the foothills of northern Tyan'-Shan'
N75-12501
ORTHOGONAL FUNCTIONS
Statistical characteristics of the vertical moisture profile in the case of cumulus clouds
N75-12495
Application of expansions with respect to natural orthogonal components in the studies of drainage --- hydrometeorological factors during spring floods
N75-12517
Modified Gram Schmidt orthogonalization and its applications, including constrained least squares approximation
[SLL-74-200] N75-12683
ORTHOSTATIC TOLERANCE
Regional hemodynamics in antiorthostatic tests of different intensity
N75-12564
Wearing of anti-G suit by persons with reduced orthostatic stability
N75-12565
OSMOSIS
Osmosis and ion transport in charged porous membranes: A macroscopic, mechanistic model --- analysis of continuum flow in charged, macroscopic pores through a charged membrane
[PUBL-74-6] N75-12242
OXIDATION
Automated analysis of oxidative metabolites
[NASA-CASE-ARC-10469-1] N75-12086
Metal oxidation laser
[AD-784760] N75-12312
OXIDES
Modification and control of oxides structures on metals and alloys [phase 4] --- specifically niobium alloys
[AD-785261] N75-12143
OXYGEN
Effect of Oxygen addition on altitude blowout and relight of an experimental combustor segment
[NASA-TM-X-3154] N75-12070
Study of the neon-oxygen laser under heavy particle bombardment
[COO-2007-45] N75-12306
Stratification phenomena in the positive column of a low pressure oxygen discharge
[AD-783054] N75-12803
OXYGEN CONSUMPTION
Concept of the characteristic time of biological processes and its application for studying the dynamics of gas exchange
N75-12554
OZONE
A mid-latitude ozone model for the US standard atmosphere, 1975 [summary]
[NASA-TM-X-70786] N75-12469

P

PACIFIC OCEAN
An assessment of the potential contributions to oceanography from Skylab visual observations and hand-held photography --- Pacific Ocean, Atlantic Ocean and Gulf of Mexico
[E75-10017] N75-12396
PAINTS
The painting of military aircraft
[DSL-TN-345] N75-12147
PARACHUTE FABRICS
Development of stretch fabric for parachute canopies
[AD-785195] N75-11902
PARACHUTES
Deploy/release system --- model aircraft flight control
[NASA-CASE-LAR-11575-1] N75-12195
PARAMETERIZATION
A three parameter analytic phase function for multiple scattering calculations
[NASA-CR-140998] N75-12674
Methods for the determination of the probability distribution and/or the parameters which best describe a set of test data
[AD-785497] N75-12691
PARAMETRIC AMPLIFIERS
Wave interactions in lossy periodic media
[AD-784660] N75-12826
PARTICLE COLLISIONS
Infrared radiation from H2O, CO2 or NH3 collisionally excited by N2, O or Ar
[AD-785412] N75-12827
PARTICLE ENERGY
Lunar particle shadows and boundary layer experiment: Plasma and energetic particles on the Apollo 15 and 16 subsatellites
[NASA-CR-140371] N75-12871
PARTICLE INTERACTIONS
Absence of strangeness-changing, neutral current effects from the symmetric quark model
N75-12813
PARTICLES
Method of sampling particles formed during burning of metallized condensed systems in constant-pressure chamber
[AD-785212] N75-12114
Study of the neon-oxygen laser under heavy particle bombardment
[COO-2007-45] N75-12306
PASSENGER AIRCRAFT
Europlane QTOL: Design parameter tradeoffs
N75-11942
PASSIVITY
Chromate passivation of brass --- using ammonium silver nitrate spot test and selenium acid test
[TN-341] N75-12122
PATHOGENESIS
Vibration disease and its pathogenesis
[AD-785202] N75-12584
PATTERN RECOGNITION
Preprocessing and feature extraction for automatic recognition of radar images
[AD-785427] N75-12186
Detectability of an unsharp edge in additive noisy background
[FOA-2-C-2391-E1-H5] N75-12577
Application of response surface methodology to shape discrimination
[AD-785367] N75-12614
Natural science research application of methods of teaching a machine pattern recognition without a teacher
[JPRS-63501] N75-12632
Boundary and object detection in real world images --- by means of algorithms
[NASA-CR-140828] N75-12734
PATTERN REGISTRATION
A system for input and output of digital pictures
[FOA-2-C-2573-E1] N75-12660
Time series model for texture synthesis
[TID-26399] N75-12692
PAVEMENTS
Liquid ice prevention and control chemicals for use on airfield pavements
[AD-785219] N75-12007
PAYLOADS
Analysis and compensation of an aircraft simulator control loading system with compliant linkage --- using hydraulic equipment
[NASA-TN-D-7747] N75-12003
Skylab program payload integration. TO27 sample array
[NASA-CR-120531] N75-12011
PCM TELEMETRY
NCAR telemetry and command system --- development of system for recovering and reproducing data from balloon-borne experiments
N75-12761
Airoscope command system --- pulse code modulation telemetry command system for data link with balloons
N75-12763

PDP COMPUTERS
Introduction to RATS [RISOS/ARPA Terminal System]: An operating system for the DEC PDP-11/45 [UCRL-51582] N75-12662
PDP 8 COMPUTER
On-line data acquisition and data processing in a meteorological tower-PDP-8/I-CALAS system coupling [KFK-1934] N75-12532
Supporting program and program system for the assembly program in Tiros [FOA-1-C-1470-C4] N75-12633
Combined use of Tiros and DETEF systems for programming, data collection and evaluation of data output [FOA-1-C-1474-C4] N75-12653
PENTANES
Absorption studies with pentanes for labeling pore structure and material transport in porous silica N75-12145
PERFORATED PLATES
Shear buckling of square perforated plates [NASA-CR-132548] N75-12364
PERFORMANCE PREDICTION
Effect of swirling flow on augmentor performance -- - turbojet engines application [NASA-CR-134639] N75-11972
Space shuttle orbiter vehicle star tracker test program plan [NASA-CR-140349] N75-12025
A computerized system for reliability predictions: RRP-1. Part 1: Introduction [FTL-A-A16;23-PT-1] N75-12344
A simulator study to investigate human operator workload N75-12589
Prediction of pilot performance: Biochemical and sleep-mood correlates under high workload conditions --- during aircraft carrier landings N75-12599
PERFORMANCE TESTS
Information on attack helicopters: A comparison [FOA-2-C-2597-F8] N75-11934
Tests on axial velocity sensor --- electrodynamic principle N75-12049
Fabrication and performance assessment of shaped charges --- damage capacity of the warmead [DSL-546] N75-12155
Characterization and evaluation of materials for magnetic domain propagation [orthoferrites, garnets] [REPT-8562] N75-12194
Summarized results of tests on Singer-Kearfott's gyroflex gyro [FOA-2-A-2562-E4] N75-12282
Sample test reports for camera, still picture, KA-91B --- performance tests of camera for aerial reconnaissance [AD-785399] N75-12294
Duration of program for program optimization [FOA-P-C-8350-M3[E5]] N75-12655
PERMITTIVITY
Transition probabilities, correlation functions and dielectric permittivity tensors for semibounded and bounded nonequilibrium plasma [ITF-74-21E] N75-12800
PERSONNEL MANAGEMENT
Some consequences of rapid managerial succession in complex organizations: A validation study [AD-785442] N75-12844
Personnel management --- bibliography [AD-785350] N75-12846
PHASE SHIFT CIRCUITS
Surface acoustic wave notch filter using a phase-shifting technique [AD-785569] N75-12214
PHASE TRANSFORMATIONS
Studies on non-crystalline iron halogenid layers by application of Mossbauer spectroscopy N75-12119
Study of phase transformations in titanium alloy. 3: Study of isothermal transformations of Beta 3 titanium alloy [CEA-R-4567] N75-12130
Phase transformations in titanium alloys. 1. Contribution to study of transformation kinetics in Ti-6 percent Al-6 percent V-2 percent Sn alloy [CEA-R-4542] N75-12131
Type 2 film superconductors for power applications [AD-785534] N75-12220
PHOSPHORS
Colour television displays: Error diagrams for evaluating the reproduced chromaticities of some test colours --- reproduction by phosphors [BBC-RD-1974/34] N75-12733
PHOTOCHEMICAL REACTIONS
Repair of RNA [RLO-2225-T-15-19] N75-12074
PHOTOCHROMISM
Information storage in photodichroic crystals [AD-785005] N75-12109
Investigation of a photodichroic material for holographic storage and recovery [AD-785274] N75-12768
PHOTOELECTRIC CELLS
Instrument for measuring the concentration of crystalline particles N75-12503
PHOTOELECTRIC MATERIALS
Fabrication technology and materials --- for surface acoustic wave devices N75-12699
PHOTOELECTRICITY
QUICKE2: A one-dimensional code for calculating bulk and vacuum emitted photocompton currents [SLL-74-218] N75-12817
PHOTOGEOLOGY
Geologic and mineral and water resources investigations in Western Colorado, using Skylab EREP data --- Utah [E75-10043] N75-12412
PHOTOGRAMMETRY
Leveling of elevations in blocks compiled from flight-line nets in phototriangulation [AD-783830] N75-12426
PHOTOGRAPHIC DEVELOPERS
Low contrast long latitude developer for high resolution plates and films [SLA-74-97] N75-12292
PHOTOGRAPHIC EQUIPMENT
Aircraft accident medical investigator's kit [AD-785389] N75-12583
PHOTOGRAPHIC FILM
Low contrast long latitude developer for high resolution plates and films [SLA-74-97] N75-12292
PHOTOGRAPHIC PROCESSING EQUIPMENT
Low contrast long latitude developer for high resolution plates and films [SLA-74-97] N75-12292
PHOTOGRAPHS
A review of picture processing by computer [FOA-2-C-2583-E1] N75-12656
PHOTOINTERPRETATION
Geologic and mineral and water resources investigations in Western Colorado, using Skylab EREP data --- Utah [E75-10043] N75-12412
A review of picture processing by computer [FOA-2-C-2583-E1] N75-12656
PHOTOMAPPING
Mapping exposed silicate rock types and exposed ferric and ferrous compounds from a space platform [E75-10008] N75-12392
Hydrologic significance of lineaments in central Tennessee [E75-10030] N75-12401
PHOTOSYNTHESIS
Effect of light on respiration and development of photosynthetic cells [COO-3231-2] N75-12549
PHYSICAL FACTORS
Mathematical model describing the influence of biological and physical processes on the biological conditions in a sea [PT-1972:5] N75-12538
PHYSICAL PROPERTIES
Develop techniques and procedures, using multispectral systems, to identify from remotely sensed data the physical and thermal characteristics of plants and soil [E75-10033] N75-12403
PHYSICAL WORK
Concept of the characteristic time of biological processes and its application for studying the dynamics of gas exchange N75-12554
PHYSIOLOGICAL EFFECTS
The final Skylab mission: Man at home and at work in space [NASA-TM-X-70394] N75-12019
PHYSIOLOGICAL RESPONSES
Changes in physiological functions of monkeys in a reduced gravitation stand N75-12555
Physiological costs of extended airborne command and control operations --- human performance and sleep deprivation N75-12603
PIEZOELECTRICITY
Proposed method and device for obtaining piezoelectric constants of ceramic cylindrical shells [AD-785008] N75-12150
PIGEONS
The tolerance of birds to airblast [AD-785259] N75-12550
PILOT PERFORMANCE
Control authority with a flight performance controller --- development of aircraft system for pilot control of aircraft bank angle and vertical speed [AD-784889] N75-11953
Laboratory research into human information processing --- pilot workload modeling N75-12590
Evaluating measures of workload using a flight simulator N75-12591
A flight simulator study of missile control performance as a function of concurrent workload --- task complexity effects N75-12592
Pilot landing performance under high workload conditions --- considering day and night proficiencies N75-12594
Prediction of pilot performance: Biochemical and sleep-mood correlates under high workload conditions --- during aircraft carrier landings N75-12599
New or newly tested methods for the assessment of pilots' workload --- conference [DLR-MITT-74-19] N75-12605
Investigation of pilot's role and display requirements in automatic landings [NASA-CR-140844] N75-12617
PILOT SELECTION
Space biology and aerospace medicine, volume 8, no. 5, 1974 [JPRS-63603] N75-12552
Some problems in evaluating the vestibular function of aviators and cosmonauts N75-12561
Psychophysiological stress investigations of an instrument-coordination analyzer N75-12607
PILOT TRAINING
Simulation and study of high workload operations -- - psychophysiological effects on air crews [AGARD-CP-146] N75-12587
The air defence role --- pilot training in complex tasks N75-12602
PINS
Calculation of incipient fracture at a shrink-fit pin interference [SLL-73-63] N75-12367
PIONEER SPACE PROBES
Jupiters radiation belts and their effects on spacecraft [NASA-CR-140841] N75-12870
Pioneer Jupiter/Saturn press reference N75-12879
PIPE FLOW
Flutter of conservative systems of pipes containing subsonic flow [MERL-TN-73-2] N75-12236
PIPES [TUBES]
Application of eddy currents to detect corrosion in copper and stainless steel tubing [K-1860] N75-12134
PISTON ENGINES
Analysis of the working process of a free piston expander N75-12240
PISTON THEORY
Analysis of the working process of a free piston expander N75-12240
PISTONS
Calculation of bearing loads and displacement paths in fast running high performance diesel engines at different point loads with emphasis on speed drop N75-12332
PITOT TUBES
The Pitot pressure in magnetogasdynamic flows N75-12787
PITTING
Fifth International Congress on Metal Corrosion [FOA-1-C-1493-G3[G1]] N75-12129
PLANAR STRUCTURES
An experimental study of coupling effects in a planar array antenna --- reflection factor calculation [FOA-3-C-3728-E2] N75-12704
PLANE WAVES
Analysis of crossed wires in a plane-wave field --- induced electric currents and charges [AD-784972] N75-12219
Excitation of plane thermoelastic waves in a layer with a finite rate of heat propagation [AD-785190] N75-12820
Determination of contained functions in the modified-plane-wave method of band structure calculation [AD-785515] N75-12823
PLANETARY ATMOSPHERES
Annular arc accelerator shock tube [NASA-CASE-NPO-13528-1] N75-11997
PLANETARY EVOLUTION
Titius-Bode law and the possibility of recent large scale evolution in the solar system [LA-UR-74-919] N75-12876
PLANETARY QUARANTINE
Environmental microbiology as related to planetary quarantine --- synergetic effect of heat and radiation [NASA-CR-140941] N75-12622
PLANT ROOTS
Empirical model of the root system of winter wheat considering weather conditions and the soil moisture distribution by layers N75-12499
PLANTS [BOTANY]
Repair of RNA [RLO-2225-T-15-19] N75-12074

Develop techniques and procedures, using multispectral systems, to identify from remotely sensed data the physical and thermal characteristics of plants and soil --- Southern Texas
[E75-10012] N75-12394
Develop techniques and procedures, using multispectral systems, to identify from remotely sensed data the physical and thermal characteristics of plants and soil
[E75-10033] N75-12403

PLASMA ACCELERATION
Pulsed electromagnetic gas acceleration
[NASA-CR-140996] N75-12775
Rotating plasma disk in stationary operation N75-12784

PLASMA ACCELERATORS
Principles of an axisymmetric MPD-accelerator with external magnetic field N75-12785
Plasma accelerators
[AD-785108] N75-12806
Dynamic of the current sheath in a pulsed coaxial injector
[AD-785115] N75-12809

PLASMA CHEMISTRY
Plasma chemistry and the dynamics of carbon foils irradiated by high intensity laser pulses
[LA-5532-MS] N75-12794

PLASMA CLOUDS
Phase A conceptual design study of the Atmospheric, Magnetospheric and Plasmas in Space [AMPS] payload
[NASA-TM-X-64895] N75-12014

PLASMA DYNAMICS
Magnetofluiddynamics --- conference
[DLR-MITT-74-20] N75-12779
Aspects of plasmadynamic lasers: High outputs at short wavelengths N75-12790
Investigations in plasma dynamics --- plasma instabilities
[COO-3004-6] N75-12798
Study of field-plasma interaction by transient techniques
[AD-785404] N75-12805
Plasma accelerators
[AD-785108] N75-12806

PLASMA ENGINES
Development of a Stationary Plasma Motor [SPM] and its testing on the meteor N75-12066

PLASMA GENERATORS
Problems in the generation of extremely dense plasmas by means of electric wire explosions N75-12781

PLASMA HEATING
Possibility of heating TFR plasmas by the absorption of fast magnetohydrodynamic waves
[EUR-CEA-FC-711] N75-12793

PLASMA INTERACTIONS
Applicability of absorber-ratio methods to beam-plasma systems
[AD-785238] N75-12802

PLASMA JETS
Method of preparing water purification membranes --- polymerization of allyl amine as thin films in plasma discharge
[NASA-CASE-ARC-10643-1] N75-12087
Investigation on the plasma jet - Dipolar magnetic field interaction N75-12786
Fast expanding carbon plasma jets as laser-active medium? N75-12789

PLASMA PHYSICS
Magnetofluiddynamics --- conference
[DLR-MITT-74-20] N75-12779
Applicability of absorber-ratio methods to beam-plasma systems
[AD-785238] N75-12802

PLASMA SHEATHS
Dynamic of the current sheath in a pulsed coaxial injector
[AD-785115] N75-12809

PLASMA WAVES
Interactions of fast particles with waves of cosmic magnetoactive plasma
[NP-20009] N75-12792

PLASMA-ELECTROMAGNETIC INTERACTION
Investigation on the plasma jet - Dipolar magnetic field interaction N75-12786
The Pitot pressure in magnetogasdynamic flows N75-12787

PLASMA-PARTICLE INTERACTIONS
Laser plasma studies with the Sandia four-beam system
[SLA-73-7064] N75-12304
Interactions of fast particles with waves of cosmic magnetoactive plasma
[NP-20009] N75-12792
Lunar particle shadows and boundary layer experiment: Plasma and energetic particles on the Apollo 15 and 16 subsatellites
[NASA-CR-140371] N75-12871

PLASMAS [PHYSICS]
Effect of charge exchange reactions on neoclassical transport
[ORNL-TM-4606] N75-12727
Pulsed electromagnetic gas acceleration
[NASA-CR-140996] N75-12775
Hydromagnetic wave propagation in a three-dimensional Magnetosphere, 2 N75-12777
Propagation of electron waves in a non-Maxwellian plasma
[ISAS-517-VOL-39-14] N75-12778
Possibility of heating TFR plasmas by the absorption of fast magnetohydrodynamic waves
[EUR-CEA-FC-711] N75-12793
Investigations of plasma dielectric functions --- analysis from electric network theory
[RISO-301] N75-12796
Investigations of plasma instabilities
[AD-784967] N75-12808

PLASTIC PROPERTIES
Seminar on load calculations
[REPT-72-6] N75-12372

PLUMES
Effects of air breathing engine plumes on SSV orbiter subsonic wing pressure distribution [OA57B], volume I
[NASA-CR-134416] N75-12034
Effects of the air breathing engine plumes on SSV orbiter subsonic wing pressure distributions [OA57A]
[NASA-CR-134414] N75-12040
Field investigations of heated discharges from nuclear power plants on Lake Michigan, 1972
[ANL/ES-32] N75-12457

PLUTONIUM
Design of a heat source for a Navy radioisotopic power generator --- use of plutonium in fuel capsules
[MLM-2103] N75-12444

POINTING CONTROL SYSTEMS
An assessment of the Instrument Pointing Subsystems [IPS] requirements for spacelab missions
[NASA-TM-X-64896] N75-12018

POISSON EQUATION
Subcritical and supercritical compressible flows without shock in vane meshes
[AAAF-NT-74-1] N75-12225

POLAND
Katowice Main Information Science Center described N75-12830
Installation of R-20 computer described N75-12831
Translations on Eastern Europe: Scientific affairs, no. 438 --- electronics and laser research in Poland
[JPRS-63447] N75-12836

POLAR REGIONS
Features of polar cusp electron precipitation associated with a large magnetic storm
[NASA-TM-X-70792] N75-12873

POLARITY
Modelling geomagnetic polarity transitions
[AD-785255] N75-12480
On the use of Godhavn H-component as an indicator of the interplanetary sector polarity
[NASA-CR-140858] N75-12867

POLARIZATION [WAVES]
A proposal to study polarizations for hydromagnetic waves observed at ATS-1 --- using magnetometer
[NASA-CR-140857] N75-12464

POLARIZED LIGHT
Instrument for measuring the concentration of crystalline particles N75-12503

POLITICS
Oil for the free world in the 1970's --- demand and supply
[AD-779352] N75-12448

POLLUTION CONTROL
Automobile emission standards
[S-REPT-93-598] N75-12452
Definition of heavy industry, guidelines for acceptable manufacturing uses, and plan for manufacturing gases in Delaware's coastal zone N75-12855
Public land use controls in Delaware's coastal zone N75-12856

POLLUTION MONITORING
Airborne vapor surveillance system
[AD-785585] N75-12459

POLYAMIDE RESINS
Procedure for the isolation and determination of aldosterone in human urine by thin-film chromatography on polyamide and BTC micro-reaction
[RAE-LIB-TRANS-1778] N75-12579

POLYMERIZATION
Method of preparing water purification membranes --- polymerization of allyl amine as thin films in plasma discharge
[NASA-CASE-ARC-10643-1] N75-12087

POLYMERS
A three-dimensional structure model for a high modulus pan-based carbon fiber
[AD-784415] N75-12085
Interferometric study of some organotin polymers
[DSL-TN-388] N75-12092
A relaxometer for polymer material
[FOA-4-C-4533-G2] N75-12287

POROUS MATERIALS
Absorption studies with pentanes for labeling pore structure and material transport in porous silica N75-12145
A self-lubricating bearing
[NASA-CASE-MFS-23009-1] N75-12328

POTASSIUM CHLORIDES
Information storage in photodichroic crystals
[AD-785005] N75-12109

POTENTIAL FLOW
Subcritical and supercritical compressible flows without shock in vane meshes
[AAAF-NT-74-1] N75-12225

POTENTIOMETERS [RESISTORS]
Ganged series potentiometer mixer networks
[NASA-CR-140850] N75-12209

POWDER METALLURGY
Preparation of substoichiometer titanium carbides and mixed titanium-tantalum carbides --- using powder metallurgy and sintering techniques
[CEA-N-1684] N75-12079

PRANDTL NUMBER
Approximate analysis of heat transfer in transpired boundary layers at limiting Prandtl numbers
[AD-785239] N75-12255

PRECIPITATION [METEOROLOGY]
Numerical models for precipitation scavenging
[COO-1407-52] N75-12474
Project Skywater --- precipitation management for water reclamation
[REC-ERC-73-17] N75-12487
Procedure for five-day forecasting of significant and weak precipitation in the territory of Northern Kazakhstan in May - July N75-12496
Analysis of two cases of significant precipitation observed in the foothills of northern Tyan'-Shan' N75-12501
Accuracy of measuring the amount of precipitation by a single-wave radar N75-12523
On the form of spectra of radar echoes from precipitation
[FOA-P-C-8351-M7] N75-12528

PREDICTION ANALYSIS TECHNIQUES
Laboratory research into human information processing --- pilot workload modeling N75-12590
Information theory aspects of long range analyses
[FOA-2-C-2568-E1] N75-12848

PREDICTIONS
A look at the future of electronic components
[FTL-A-A28:1] N75-12210

PREMIXED FLAMES
A unified statistical model of the premixed turbulent flame
[AASU-335] N75-12094

PRESSURE
Stress analysis of a radial nozzle attached to a cylindrical shell under internal pressure
[ORNL-TM-4269] N75-12366

PRESSURE BREATHING
Content of glycogen and glucoso-6-phosphatase activity in the tissues of rabbits after prolonged exposure to the increased pressure of a helium-oxygen atmosphere N75-12558

PRESSURE DISTRIBUTION
Effects of air breathing engine plumes on SSV orbiter subsonic wing pressure distribution [OA57B], volume I
[NASA-CR-134416] N75-12034
Effects of the air breathing engine plumes on SSV orbiter subsonic wing pressure distributions [OA57A]
[NASA-CR-134414] N75-12040

PRESSURE GAGES
Control unit for the control system of a rocket with liquid type engine
[FOA-1-C-1471-D3] N75-12068

PRESSURE GRADIENTS
On the flow near a weak shock wave downstream of a nozzle throat --- numerical analysis of pressure gradient, streamline curvature, and shock wave curvature
[AD-785283] N75-12257

PRESSURE MEASUREMENTS
Observations on blast explosions at Medeo, USSR, 1966
[FOA-4-C-4523-A1] N75-12156

PRESSURE REGULATORS
Rolamite rolling-gate valves --- evaluation of design and manual operation
[AD-785229] N75-12340

PRESSURE SENSORS
Continuous-output terminal-shock-position sensor for mixed-compression inlets evaluated in wind tunnel tests of YF-12 aircraft inlet
[NASA-TM-X-3144] N75-11971

PRESSURE VESSEL DESIGN
Development of an improved technique for forming acrylic spheres --- application to underwater habitation and exploration
[AD-784113] N75-12337

PRINTERS [DATA PROCESSING]
A program for listing card indices for A4 reports
[FOA-2-C-2589-E5] N75-12658
PROBABILITY DISTRIBUTION FUNCTIONS
Methods for the determination of the probability distribution and/or the parameters which best describe a set of test data
[AD-785497] N75-12691
PROBABILITY THEORY
Some new algorithms for deterministic and probabilistic communication networks
[AD-785119] N75-12184
Principles of the reliability theory of mechanical systems, chapter 8
[AD-785209] N75-12349
Obtaining initial vectors for minimizing the probability of misclassification
[NASA-CR-140348] N75-12675
PROBLEM SOLVING
Direct method based projections for solving systems of linear equations
[IS-3396] N75-12680
PROCUREMENT MANAGEMENT
An exploration into the practices of DCAS industrial specialists in obtaining contractor production information on high priority, medium value contracts
[AD-785441] N75-12854
PRODUCT DEVELOPMENT
Europlane QTOL: A European project proposal
N75-11941
Design and development of a momentum wheel with a mainly passive magnetic bearing, phase 1. Volume 2: Annexes --- momentum wheel with magnetic bearings
[ESRO-CR[P]-506] N75-12041
Lithium-doped solar cell pilot line fabrication and test programs
[NASA-CR-140843] N75-12433
PRODUCTION ENGINEERING
Report on attendance at Arbeitstagung: Gase in Metallen at Darmstadt and visits to August-Thyssen-Hutte AG at Duisburg and the Max Planck Institute at Stuttgart, March 1972
[FOA-4-C-4519-F3] N75-12126
PRODUCTION MANAGEMENT
An exploration into the practices of DCAS industrial specialists in obtaining contractor production information on high priority, medium value contracts
[AD-785441] N75-12854
PROGRAMMING LANGUAGES
Scheduling language and algorithm development study. Appendix: Study approach and activity summary
[NASA-CR-140363] N75-12630
PL360 compiler with macros
[FOA-P-C-8359-M3[E5]] N75-12639
On high level digital system design
[AD-785570] N75-12666
PROJECT MANAGEMENT
AAFE man-made noise experiment project. Volume 3: Appendices
[NASA-CR-132511] N75-12170
Multilevel model for the synthesis of reliable programs --- applications of computer language for program improvement
[UCLA-10-P-14-126] N75-12347
PROJECTILES
FORTRAN program for calculating the trajectory of projectiles
[FOA-2-A-2564-D8] N75-11894
An improved projectile boattail
[AD-785520] N75-11900
Experimental magnus characteristics of several ballistic projectiles with various boattail angles and lengths at Mach numbers 1.5, 2.0, and 1.5
[AD-785346] N75-11908
PROJECTION
Algorithms for projection methods for solving linear systems of equations
[IS-3397] N75-12684
PROPAGATION
Measure of the characteristics of TEA CO2 amplifier and experimental study of the propagation of a laser pulse with an exponential front in the amplifying media and absorption at 10.6 microns
[DREV-R-710/74] N75-12301
PROPANE
Constant-volume gas turbine: Experiments with gaseous fuel in butterfly valved combustors
[ARL/ME-NOTE-347] N75-11976
PROPELLANT COMBUSTION
A unified theory of solid propellant ignition. Part 1: Development of mathematical model
[AD-785231] N75-12158
A unified theory of solid propellant ignition. Part 2: Computer program
[AD-785232] N75-12159
PROPELLANT TANKS
A hypersonic force and moment test of a 0.006 scale model [466] of the 330.2 inch diameter external tank in the Ames Research Center 3.5 foot hypersonic wind tunnel [TA9F] --- space shuttle development
[NASA-CR-134425] N75-12032
PROPULSION SYSTEM CONFIGURATIONS
Pilot model for aero propulsion test sled
[AD-785125] N75-12006
PROPULSION SYSTEM PERFORMANCE
Propulsion concepts for STOL aircraft --- high bypass turbofan engines and air supply system for wings with internally blown flaps
N75-11948
A 727/JT8D-100 series engine exhaust system propulsion performance model test
[NASA-CR-134617] N75-11984
PROSTHETIC DEVICES
Laser cane for the blind
[FOA-2-C-2595-H5] N75-12300
The mobility of the human arm: Motion analysis and possibilities of a simplified kinematical prosthetic system
N75-12551
Orthotic arm joint --- for use in mechanical arms
[NASA-CASE-MFS-21611-1] N75-12616
PROTECTIVE COATINGS
Development for application of parylene coatings --- to hybrid microcircuits devices
[NASA-CR-120536] N75-12208
PROTON FLUX DENSITY
Proton tissue dose for the blood forming organ in human geometry: Isotropic radiation
[NASA-TM-X-3089] N75-12573
PROTONS
Clustering of water on hydrated protons in a supersonic free jet expansion
[AD-785284] N75-12263
PSEUDORANDOM SEQUENCES
Some techniques for testing pseudo-random number sequences
[AD-785379] N75-12688
PSYCHOLOGICAL FACTORS
Emotional and biochemical effects of high workload --- in pilot landing performance
N75-12598
PSYCHOMETRICS
Quantitative analysis of psychophysical stress in operating complex dynamic systems
N75-12606
PSYCHOMOTOR PERFORMANCE
New or newly tested methods for the assessment of pilots' workload --- conference
[DLR-MITT-74-19] N75-12605
Quantitative analysis of psychophysical stress in operating complex dynamic systems
N75-12606
PSYCHOPHYSIOLOGY
Complex psychophysiological evaluation of the readability of symbolic information
[RAE-LIB-TRANS-1777] N75-12575
Prediction of pilot performance: Biochemical and sleep-mood correlates under high workload conditions --- during aircraft carrier landings
N75-12599
Psychophysiological stress investigations of an instrument-coordination analyzer
N75-12607
PULSARS
A new measurement of the Her X-1 X-ray pulse profile
[NASA-TM-X-70578] N75-12863
Interstellar scattering of pulsar radiation. 1: Scintillation
[NASA-TM-X-70789] N75-12887
PULSE CODE MODULATION
Adaptive differential PCM speech transmission
[AD-785124] N75-12191
NCAR telemetry and command system --- development of system for recovering and reproducing data from balloon-borne experiments
N75-12761
PULSE COMMUNICATION
Field testing of a system for communication with commercial SNM shipments
[SLA-74-5431] N75-12181
PULSE GENERATORS
Optimum response simulation of multidegree systems by pulse excitation --- by use of a computer algorithm
[AD-783226] N75-12382
PULSED LASERS
Laser pulse propagation code
[LA-5607-MS] N75-12307
Rotational relaxation measurements and resonant phenomena in laser-excited hydrogen fluoride
[AD-784952] N75-12321
PYLONS
Theoretical prediction of thick wing and pylon-fuselage-fanpod-nacelle aerodynamic characteristics at subcritical speeds. Part 1: Theory and results
[NASA-CR-137578] N75-11935
Theoretical prediction of thick wing and pylon-fuselage-fanpod-nacelle aerodynamic characteristics at subcritical speeds. Part 2: Computer program description
[NASA-CR-137579] N75-11936
PYROLYTIC GRAPHITE
Differential capacitance study on the edge orientation of pyrolytic graphite and glassy carbon electrodes
[AD-785263] N75-12083
PYROLYTIC MATERIALS
Pyrocarbon and its application to reactor technology
[GERHTR-86] N75-12080

Q

QUALITY CONTROL
Cleaning and corrosion control of avionics equipment at all levels of maintenance
[AD-784975] N75-11968
QUANTUM THEORY
Value of fundamental constants --- dependent on renormalized quantum field theory
[COO-2271-34] N75-12828
QUARKS
Absence of strangeness-changing, neutral current effects from the symmetric quark model
N75-12813

R

RABBITS
Content of glycogen and glucoso-6-phosphatase activity in the tissues of rabbits after prolonged exposure to the increased pressure of a helium-oxygen atmosphere
N75-12558
Activity of blood enzymes in rabbits exposed to high-mountain hypoxia
N75-12559
RADAR APPROACH CONTROL
Measurement and estimation procedure for flight safety control operator workload
N75-12609
RADAR ECHOES
On the form of spectra of radar echoes from precipitation
[FOA-P-C-8351-M7] N75-12528
RADAR EQUIPMENT
Kivach-1 and Kivach-2 marine navigation radar sets --- development of improved shipborne radar for navigation
[AD-785338] N75-11920
SAR image quality analysis model, volume 2
[AD-785398] N75-12187
Review of current radar interests and extending the radar spectrum to the HF and the milimeter wave bands
[AD-785007] N75-12190
RADAR IMAGERY
A simulation of synthetic aperture radar imaging of ocean waves
[NASA-TM-X-72629] N75-12172
Preprocessing and feature extraction for automatic recognition of radar images
[AD-785427] N75-12186
SAR image quality analysis model, volume 2
[AD-785398] N75-12187
RADAR MEASUREMENT
Accuracy of measuring the amount of precipitation by a single-wave radar
N75-12523
RADAR NAVIGATION
Kivach-1 and Kivach-2 marine navigation radar sets --- development of improved shipborne radar for navigation
[AD-785338] N75-11920
RADAR SIGNATURES
Radar signature measurements of BQM-34A and BQM-34F target drones, volume 1A
[AD-785219] N75-12182
RADAR TRACKING
Comparison of the theoretical errors in the simultaneous measurement of round trip delay and Doppler frequency for several radar waveforms
[SLA-74-30] N75-12179
Radar studies of bird migration
[NASA-CR-139802] N75-12544
RADAR TRANSMISSION
Comparison of the theoretical errors in the simultaneous measurement of round trip delay and Doppler frequency for several radar waveforms
[SLA-74-30] N75-12179
Systems applications and implementation 2: Radar --- employing surface acoustic wave devices
N75-12701
RADIAL DISTRIBUTION
Some observations of the effects of radial distortions on performance of a transonic rotating blade row
[NASA-TN-D-7824] N75-12245
RADIANT HEATING
Instrument to measure radiant heat fluxes --- principles and construction of absolute two-sided radiometer
N75-12280
RADIATION
Methods of calculating the variations in the total flux of radiant energy for purposes of long range forecasting of large scale meteorological fields
N75-12490
RADIATION BELTS
Jupiter radiation belt models [July 1974]
[NASA-CR-140845] N75-12869
Jupiters radiation belts and their effects on spacecraft
[NASA-CR-140841] N75-12870

RADIATION DETECTORS
Determination of the efficiency and angular directivity of cosmic gamma ray detectors
N75-12281

RADIATION DOSAGE
Proton tissue dose for the blood forming organ in human geometry: Isotropic radiation
[NASA-TM-X-3089] N75-12573
Compilation of occupational radiation exposure from light water cooled nuclear power plants, 1969 - 1973
[WASH-1311] N75-12724
Estimates of radiation exposure from solar cosmic rays in SST altitudes
[NASA-TM-X-71990] N75-12883

RADIATION EFFECTS
Mechanical properties of Skylab thermal shield materials after prolonged ultraviolet irradiation
[NASA-TN-D-7844] N75-12144
Response of materials to laser radiation: A short course
[AD-785010] N75-12314
Effects of high power lasers, no. 3
[AD-785401] N75-12316
Effects of ionizing radiation on diffused resistors
[SLA-74-5148] N75-12717
Jupiters radiation belts and their effects on spacecraft
[NASA-CR-140841] N75-12870

RADIATION HARDENING
Structural analysis on silicon after implantation of carbon ions in the energy region of 1 to 3 MeV
N75-12146

RADIATION INJURIES
Peculiarities in the formation of cataracts in mice after irradiation by 645 MeV protons and Co60 gamma rays
N75-12557
Changes in mass of biological cells when irradiated with Q-pulsed ruby laser
[FOA-2-C-2586-E6] N75-12578

RADIATION MEASUREMENT
Criteria for personal dosimetry in mixed radiation fields in space --- analyzing trapped protons, tissue disintegration stars, and neutrons
[NASA-CR-140365] N75-12574
The 100 micron surveys in the Northern and Southern Hemispheres --- balloon-borne instrument general sky survey
N75-12737
Operation of Polish equipment used on Interkosmos space satellite described --- specifically - radiospectrograph onboard Intercosmos-Kopernik 500 satellite
N75-12833

RADIATION SHIELDING
Guide of fire protection in caves, canyons, and hot cells
[ARH-3020] N75-12163
Optimization of time variable thickness of radiation protection against solar flare protons --- manned spacecraft shielding
N75-12567

RADIATIVE HEAT TRANSFER
Radiative property data for Venusian entry: A compendium
[NASA-SP-348] N75-12880

RADIO ANTENNAS
AAFE man-made noise experiment project. Volume 1: Introduction experiment definition and requirements
[NASA-CR-132509] N75-12168

RADIO ASTRONOMY
The 7th URSI Congress in Warsaw, 1972
[FOA-3-C-3738-E8] N75-12175

RADIO BEACONS
An advanced air traffic management concept based on extensions of the upgraded third generation ATC system. System B: Discrete Address Beacon System (DABS) accuracy and coverage requirements
[AD-785311] N75-11925

RADIO CONTROL
Homing, chapter 6 --- radio control and command for missiles
N75-12173

RADIO ELECTRONICS
The 7th URSI Congress in Warsaw, 1972
[FOA-3-C-3738-E8] N75-12175

RADIO EQUIPMENT
Multishot thermal battery --- power source for radio equipment
[AD-785584] N75-12450

RADIO FREQUENCIES
AAFE man-made noise experiment project. Volume 1: Introduction experiment definition and requirements
[NASA-CR-132509] N75-12168
Inaccuracy in measurements and calibrations
[FOA-3-C-3734-E8] N75-12206

RADIO RECEIVERS
Low cost omega navigation receiver
[NASA-CR-140853] N75-11912
AAFE man-made noise experiment project. Volume 1: Introduction experiment definition and requirements
[NASA-CR-132509] N75-12168
AAFE man-made noise experiment project. Volume 2: Project and experiment discussions
[NASA-CR-132510] N75-12169

RADIO TELEMETRY
Airoscope telemetry system --- development of data link from balloon gondola to ground station
N75-12762

RADIO TRANSMISSION
The 7th URSI Congress in Warsaw, 1972
[FOA-3-C-3738-E8] N75-12175
The work of the institution for radio wave propagation [Institution 345]
[FOA-3-C-3726-E8] N75-12705
Solar-geophysical effects on northern and mid-latitude ELF propagation
[AD-785011] N75-12711

RADIO WAVES
The 7th URSI Congress in Warsaw, 1972
[FOA-3-C-3738-E8] N75-12175
The work of the institution for radio wave propagation [Institution 345]
[FOA-3-C-3726-E8] N75-12705
ULF measurements --- stimulation of ULF signals in magnetosphere
[AD-785482] N75-12714

RADIOACTIVE ISOTOPES
MC2730 radioisotopic thermoelectric generator: A development report
[SLA-74-46] N75-12446

RADIOACTIVE MATERIALS
Guide of fire protection in caves, canyons, and hot cells
[ARH-3020] N75-12163
Radioactive shipments through our states: The weakest link? --- conference
[CONF-730588] N75-12860

RADIOMETERS
Instrument to measure radiant heat fluxes --- principles and construction of absolute two-sided radiometer
N75-12280
Recordings of the spectral-radio-meter SIGNE during the summer of 1972
[FOA-2-C-2577-E1] N75-12283
Experimental evaluation of atmospheric effects on radiometric measurements using the EREP of Skylab --- Bonneville Salt Flats, Utah
[E75-10036] N75-12406
A balloon-borne cryogenically cooled filter radiometer
N75-12745

RADOMES
A low-sidelore antenna-radome study at Ka-band
[AD-785138] N75-12189

RAIN
A correction for middleton's visible and infrared radiation extinction coefficients due to rain
[AD-785121] N75-12771

RAIN GAGES
Accuracy of measuring the amount of precipitation by a single-wave radar
N75-12523

RAMAN SPECTRA
Analysis of flame emissions by laser Raman spectroscopy
[SLL-74-5244] N75-12105

RAMJET ENGINES
Pilot model for aero propulsion test sled
[AD-785125] N75-12006
Environmental investigation of pilot propulsion test sled
[AD-785134] N75-12010

RANGELANDS
Inventory of forest and rangeland resources, including forest stress --- Colorado, Georgia, and Black Hills, South Dakota
[E75-10032] N75-12402

RARE EARTH COMPOUNDS
Research in the production of rare-earth-cobalt permanent magnet material by sputter deposition
[AD-785358] N75-12166

RAREFIED GAS DYNAMICS
Low-pressure measurement by thermistor, and orifice-effect determination in rarefied gas flows
[RAE-LIB-TRANS-1734] N75-12224

RATS
Morphocytochemical reaction of the suprarenals and thymic-lymphatic system of rats after termination of hypokinesia
N75-12556

RAWINSONDES
Reduction and error analysis of the AVE 2 pilot experiment data
[NASA-CR-120496] N75-12531

RAY TRACING
Refractive index measurements by adaptive techniques [RIMDAPT: Phases 1 and 1A] --- ray tracing
[AD-785080] N75-12188

RAYLEIGH SCATTERING
Moment characterization of a doubly-spread surface scatter channel at high and low Rayleigh parameters
[AD-785286] N75-12713

RC CIRCUITS
Filters for oscillations of compex shape using varistors and varicaps
N75-12203

REACTION KINETICS
Response of materials to laser radiation: A short course
[AD-785010] N75-12314

REACTION WHEELS
Design and development of a momentum wheel with a mainly passive magnetic bearing, phase 1. Volume 2: Annexes --- momentum wheel with magnetic bearings
[ESRO-CR[P]-506] N75-12041
Momentum wheel - magnetic suspension losses by Eddy currents --- for samarium cobalt magnets
N75-12042
Measurement of axial and radial stiffness --- momentum wheel magnetic bearings
N75-12043
Theoretical study of system dynamics --- momentum wheel for satellite despinning
N75-12048
Command electronics of the inertia wheel
N75-12052

REACTOR MATERIALS
Field testing of a system for communication with commercial SNM shipments
[SLA-74-5431] N75-12181

REACTOR SAFETY
Compilation of occupational radiation exposure from light water cooled nuclear power plants, 1969 - 1973
[WASH-1311] N75-12724
Tritium economy and tritium safety of fusion power plants
[IPP-4/112] N75-12728

REACTOR TECHNOLOGY
Pyrocarbon and its application to reactor technology
[GERHTR-86] N75-12000
Survey of applications of fusion power technology to the chemical and material processing industry
[BNL-18866] N75-12440
Nuclear power growth, 1974 - 2000 --- forecasting future reactor technology
[WASH-1139-74] N75-12723

RECLAMATION
Applicability of Skylab remote sensing for detection and monitoring of surface mining activities --- strip mining and reclamation in Kentucky and Tennessee
[E75-10038] N75-12407

RECONNAISSANCE AIRCRAFT
Fighter aircraft engine dependability versus reconnaissance aircraft engine dependability when both aircraft use the same engine
[AD-785444] N75-11995
High workload tasks of aircrew in the tactical strike, attack and reconnaissance roles
N75-12601

RECREATION
Study of recreational land and open space using Skylab imagery
[E75-10020] N75-12399
Study of recreational land and open space using Skylab imagery --- southeast Michigan
[E75-10034] N75-12404

RECRYSTALLIZATION
Surface recrystallization theory of the wear of copper in liquid methane
[NASA-TN-D-7840] N75-12124

RECTIFICATION
AC electronic tunneling at optical frequencies
[NASA-CR-140802] N75-12812

REDUCED GRAVITY
Changes in physiological functions of monkeys in a reduced gravitation stand
N75-12555

REENTRY SHIELDING
Dispersion-strengthened metal fin structural test
[AD-785374] N75-12378

REENTRY VEHICLES
Fabrication of a conical composite stiffening rib --- for reentry vehicles
[SLA-74-277] N75-12370

REFERENCE SYSTEMS
Modified post-flight processor for CIRIS
[AD-785370] N75-11916

REFRACTIVITY
Interferometric study of some organotin polymers
[DSL-TN-388] N75-12092
Refractive index measurements by adaptive techniques [RIMDAPT: Phases 1 and 1A] --- ray tracing
[AD-785080] N75-12188

REFRIGERATING MACHINERY
The influence of frost formation and defrosting on the performance of air coolers
[WTHD-63] N75-12238

REGENERATIVE COOLING
Nondestructive tests of regenerative chambers --- evaluating nondestructive methods of determining metal bond integrity
[NASA-CR-134656] N75-12050

Nondestructive tests of regenerative chambers, appendix --- evaluating nondestructive methods of determining metal bond integrity
[NASA-CR-134657] N75-12059

REGIONAL PLANNING
Urban and regional land use analysis: CARETS and census cities experiment package
[E75-10019] N75-12398

REGRESSION ANALYSIS
Topics in the analysis and optimization of complex systems --- using maximum likelihood estimates
[AD-785415] N75-12689

REINFORCED PLASTICS
Effect of loading rate on crack growth in glass-epoxy sheet
[AD-785519] N75-12149

REINFORCING FIBERS
Filamentary composite laminates subjected to biaxial stress fields
[AD-785362] N75-12081
Molding of oriented short-fiber composites. 4: Characterization of fiber orientation patterns
[AD-785266] N75-12084

RELAXATION [MECHANICS]
A relaxometer for polymer material
[FOA-4-C-4533-G2] N75-12287

RELIABILITY ANALYSIS
Engines for commercial STOL transports --- high bypass turbofan
N75-11947
U. S. Army helicopter electrical system reliability and maintainability investigation. Volume 1: Document deficiency analysis
[AD-785573] N75-11961
U. S. Army helicopter electrical system reliability and maintainability investigation. Volume 2: Supplemental design guide
[AD-785574] N75-11962
Fighter aircraft engine dependability versus reconnaissance aircraft engine dependability when both aircraft use the same engine
[AD-785444] N75-11995
Reverification of the NAE 100,000-lb deadweight standard force machine
[NRC-14354] N75-12002
A computerized system for reliability predictions: RRP-1. Part 1: Introduction
[FTL-A-A16:23-PT-1] N75-12344
Reliability history of the Apollo guidance computer
[NASA-CR-140340] N75-12345
Multilevel model for the synthesis of reliable programs --- applications of computer language for program improvement
[UCLA-10-P-14-126] N75-12347

RELIABILITY ENGINEERING
Improved hot-wire electroexplosive devices --- testing concepts for improving initiation safety
[LA-UR-74-743] N75-12157
Measurement, testing, and safety technology: A compilation
[NASA-SP-5976[01]] N75-12343
Principles of the reliability theory of mechanical systems, chapter 8
[AD-785209] N75-12349

REMOTE HANDLING
Study of roles of remote manipulator systems and EVA for shuttle mission support, volume I
[NASA-CR-140364] N75-12036

REMOTE SENSORS
Systems study of an automated fire weather data system
[NASA-TM-X-62402] N75-12277
Recordings of the spectral-radio-meter SIGNE during the summer of 1972
[FOA-2-C-2577-E1] N75-12283
Feasibility study ASCS remote sensing/compliance determination system
[NASA-CR-134288] N75-12419
Automated remote measuring system in agrometeorology
N75-12518
The 100 micron surveys in the Northern and Southern Hemispheres --- balloon-borne instrument general sky survey
N75-12737
Remote sensing utility in a disaster struck urban environment
[NASA-CR-140801] N75-12858

REMOTELY PILOTED VEHICLES
Radar signature measurements of BQM-34A and BQM-34F target drones, volume 1A
[AD-785219] N75-12182

RESEARCH AND DEVELOPMENT
Long range materials research --- generation of coherent vacuum ultraviolet radiation and soft X-rays
[AD-784962] N75-12140
Texas Biannual of Electronics Research No. 19 --- progress in solid state electronics and information systems
[AD-784968] N75-12218
Translations on Eastern Europe: Scientific affairs, no. 439
[JPRS-63487] N75-12829
Translations on Eastern Europe: Scientific affairs, no. 438 --- electronics and laser research in Poland
[JPRS-63447] N75-12836
Development of solid-state microwave electronics
N75-12838
Development of integrated circuits
N75-12839
Development of microwave semiconductors
N75-12840
Development of laser technology
N75-12841

RESEARCH FACILITIES
Air Force Cambridge Research Laboratories balloon operations
N75-12752
A study of the operation of selected national research facilities
[NASA-CR-140322] N75-12842

RESEARCH MANAGEMENT
Future scientific research: The elites new Latin or a new name for some old ways of thinking
[FOA-P-C-8347-M5] N75-11981
A study of the operation of selected national research facilities
[NASA-CR-140322] N75-12842

RESEARCH PROJECTS
Collaborative research in cardiovascular dynamics and bone elasticity
[NASA-CR-140997] N75-12572
The work of the institution for radio wave propagation [Institution 345]
[FOA-3-C-3726-E8] N75-12705
Bibliography of bibliographies in the DDC collection
[AD-780700/1] N75-12851

RESERVOIRS
Flood control laws using one and two reservoirs with an exponential type hydrograph
N75-12519

RESIDENTIAL AREAS
Residential energy conservation
[TID-26534] N75-12442

RESISTORS
Effects of ionizing radiation on diffused resistors
[SLA-74-5148] N75-12717

RESOURCES MANAGEMENT
Evaluation of Skylab imagery as an information service for investigating land use and natural resources
[E75-10018] N75-12397
Project Independence: A summary
N75-12427
Project Independence
N75-12428
Definition of heavy industry, guidelines for acceptable manufacturing uses, and plan for manufacturing gases in Delaware's coastal zone
N75-12855
Public land use controls in Delaware's coastal zone
N75-12856

RESPIRATION
Effect of light on respiration and development of photosynthetic cells
[COO-3231-2] N75-12549

REVISIONS
Balloon-borne aerosol counter modifications, particle sizing accuracy tests
[AD-784866] N75-12475

REYNOLDS NUMBER
The cryogenic wind tunnel concept for high Reynolds number testing
[NASA-TN-D-7762] N75-12000

RIBONUCLEIC ACIDS
Repair of RNA
[RLO-2225-T-15-19] N75-12074

RING STRUCTURES
The effect of protocol on the response time of loop structures for data communications
[CRC-1261] N75-12174

RIVERS
Analytical modeling of thermal discharges. A review of the state of the art
[ANL/ES-18] N75-12456
Simplified method of measuring the length of highly sinuous rivers
N75-12505

ROCKET ENGINE CASES
Thermocouple installation
[NASA-CASE-NPO-13540-1] N75-12276

ROCKET NOZZLES
High chamber pressure blast tube and nozzle material evaluation, volume I
[AD-780531/0] N75-12071

ROCKET PROPELLED SLEDS
Pilot model for aero propulsion test sled
[AD-785125] N75-12006

ROCKET SOUNDING
Atmospheric processes in the 30-60 km layer in 1971 - 1973
N75-12494

ROCKET-BORNE INSTRUMENTS
Studies of the airglow, the aurora, the ion and neutral composition, and the chemistry of the terrestrial atmosphere
[NASA-CR-140960] N75-12473

ROCKS
Mapping exposed silicate rock types and exposed ferric and ferrous compounds from a space platform
[E75-10008] N75-12392
Remote sensing geophysics from Skylab --- Southern California and Nevada minerals and rocks
[E75-10045] N75-12413
Technogenic-glacial mud and rock flow in the Khibin mountain mass
N75-12521

RODS
Linear stabilization theory for curved rods
N75-12356

ROLL
Aerodynamic roll damping of a T-tail transport configuration
[NASA-TM-X-3115] N75-11898

ROSSBY REGIMES
Problem of using asynchronous meteorological data
N75-12510

ROTARY WINGS
Analysis of unmanned, tethered, rotary-wind platforms
[AD-785581] N75-11903
Major Item Special Study [MISS], CH-54A rotary wing blade
[AD-785554] N75-11906
Two-dimensional subsonic evaluation of a 15-percent thick circulation control airfoil with slots at leading and trailing edges
[AD-785230] N75-11954
Use of cholesteric liquid crystals for locating voids in adhesively bonded helicopter rotor blades
[AD-785502] N75-11963
Development of an improved design tool for predicting and simulating helicopter rotor noise
[AD-785579] N75-11993

ROTATING DISKS
Rotating plasma disk in stationary operation
N75-12784

ROTATING PLASMAS
Rotating plasma disk in stationary operation
N75-12784

ROTOR BLADES
Major Item Special Study [MISS], CH-54A rotary wing blade
[AD-785554] N75-11906
Use of cholesteric liquid crystals for locating voids in adhesively bonded helicopter rotor blades
[AD-785502] N75-11963
Cascade tests of serrated leading edge blading at high subsonic speeds
[NASA-CR-2472] N75-11983
A study on gas-liquid contact apparatus rotary atomizer
[BULL-93] N75-12231

ROTOR BLADES [TURBOMACHINERY]
Calculation of the flapwise bending, edgewise bending, and torsional vibrations of rotor blades with coupled natural modes and frequencies
[NASA-TT-F-16004] N75-11892
Some observations of the effects of radial distortions on performance of a transonic rotating blade row
[NASA-TN-D-7824] N75-12245

RUN TIME [COMPUTERS]
X-FOC: A help program for 8-16 K TIROS-FOCAL
[FOA-1-C-1507-C2[C4]] N75-12659

RUNWAY CONDITIONS
Air cushion landing systems for aircraft --- short takeoff aircraft
N75-11944

RUNWAY LIGHTS
Effects of various runway lighting parameters upon the relation between runway visual range and visual range of centerline and edge lights in fog
[NASA-TM-X-72112] N75-12604

RUNWAYS
Liquid ice prevention and control chemicals for use on airfield pavements
[AD-785319] N75-12007

RURAL AREAS
Study of recreational land and open space using Skylab imagery --- southeast Michigan
[E75-10034] N75-12404

S

SAFETY DEVICES
Fiber optic seals: Improved seal assemblies and inspection equipment for field use in international safeguards and arms control applications
[AD-785540] N75-12342

SAFETY MANAGEMENT
Measurement, testing, and safety technology: A compilation
[NASA-SP-5976[01]] N75-12343

SALINITY
Irrigation scheduling, freeze warning and soil salinity detecting --- Cameron County, Texas
[E75-10046] N75-12414

SAMPLING
Apparatus for microbiological sampling --- including automatic swabbing
[NASA-CASE-LAR-11069-1] N75-12272
Sample size determination for estimating parameters of the exponential distribution
[AD-785503] N75-12351
SATELLITE CONTROL
Stellar tracking attitude reference system
[NASA-CR-139158] N75-12026
SATELLITE NETWORKS
Interface message processors for the ARPA computer network
[AD-784951] N75-12665
SATELLITE OBSERVATION
The role of ERTS in the establishment and of a nationwide land cover information system
[NASA-CR-141045] N75-12425
Cosmic gamma-ray bursts: A review of the observational data
[LA-UR-74-833] N75-12888
SATELLITE ORIENTATION
Electrojet power plants in space --- for satellite correction and orientation systems
N75-12065
SATELLITE ROTATION
Theoretical study of system dynamics --- momentum wheel for satellite despinning
N75-12048
SATELLITE TRACKING
Optical stellar interferometry for satellite surveillance
[AD-784947] N75-12866
SATELLITE-BORNE PHOTOGRAPHY
An assessment of the potential contributions to oceanography from Skylab visual observations and hand-held photography --- Pacific Ocean, Atlantic Ocean and Gulf of Mexico
[E75-10017] N75-12396
SATURN [PLANET]
Pioneer Jupiter/Saturn press reference
N75-12879
SCALE MODELS
A 727/JT8D-100 series engine exhaust system propulsion performance model test
[NASA-CR-134617] N75-11984
Aerodynamic results of wind tunnel separation tests on a 0.01-scale model [32-OTS] space shuttle integrated vehicle in the AEDC-VKF-SWTA [IA57]
[NASA-CR-134401] N75-12029
Results of investigations on an 0.015-scale 140A/B configuration of the Rockwell International space shuttle orbiter [model 49-O] in the NASA/Ames Research Center 3.5-foot hypersonic wind tunnel [OA36]
[NASA-CR-134430] N75-12031
A hypersonic force and moment test of a 0.006 scale model [466] of the 330.2 inch diameter external tank in the Ames Research Center 3.5 foot hypersonic wind tunnel [TA9F] --- space shuttle development
[NASA-CR-134425] N75-12032
Effects of wing/elevon gap sealing flapper doors on orbiter elevon effectiveness of model 16-0 in the NAAL 7.75 by 11 foot continuous flow wind tunnel [OA119A]
[NASA-CR-134421] N75-12035
SCANNERS
Antennas with controlled position of the directivity pattern in space [scanning antennas], chapter 2
N75-12202
SCANNING
Basic research in scanning electron microscopy. --- using field emission guns and Elmiskope 101
[BMFT-FB-T-74-09] N75-12289
On the scanning electron microscopy of thin specimens in transmission
N75-12291
SCATTERING
Interstellar scattering of pulsar radiation. 1: Scintillation
[NASA-TM-X-70789] N75-12887
SCATTERING FUNCTIONS
A three parameter analytic phase function for multiple scattering calculations
[NASA-CR-140998] N75-12674
SCAVENGING
Numerical models for precipitation scavenging
[COO-1407-52] N75-12474
SCHEDULING
Scheduling language and algorithm development study. Appendix: Study approach and activity summary
[NASA-CR-140363] N75-12630
SCHROEDINGER EQUATION
Application of wave mechanics theory to fluid dynamics problems: Fundamentals
[NASA-CR-140847] N75-12228
SCINTILLATION
Interstellar scattering of pulsar radiation. 1: Scintillation
[NASA-TM-X-70789] N75-12887
SCOUT LAUNCH VEHICLE
AAFE man-made noise experiment project. Volume 3: Appendices
[NASA-CR-132511] N75-12170
SCREWS
Contribution to the exact determination of the notch factor in screwed nut joints
N75-12327
SEALERS
Fiber optic seals: Improved seal assemblies and inspection equipment for field use in international safeguards and arms control applications
[AD-785540] N75-12342
SEALING
Effects of wing/elevon gap sealing flapper doors on orbiter elevon effectiveness of model 16-0 in the NAAL 7.75 by 11 foot continuous flow wind tunnel [OA119A]
[NASA-CR-134421] N75-12035
SEALS [STOPPERS]
Exploratory investigation for reducing labyrinth seal leakage in high pressure ratio gas turbines
[AD-781005/4] N75-12341
SEATS
Design and mockup evaluation of a high-strength armored crew seat for transport/cargo aircraft
[AD-785145] N75-11956
SECONDARY EMISSION
Mass and energy dependence of secondary electron emission from metals, studied for ions in 22 elements from lithium to lead
N75-12811
SECURITY
Introduction to RATS [RISOS/ARPA Terminal System]: An operating system for the DEC PDP-11/45
[UCRL-51582] N75-12662
Energy and security: Implications for American policy
[AD-785084] N75-12857
SEDIMENT TRANSPORT
New England Continental Shelf dynamics pilot experiment
[AD-785257] N75-12542
SEDIMENTS
Problem of the method of determining the composition of bottom deposits and suspensions --- analysis of sediment fall velocity errors
N75-12520
SEISMIC WAVES
Seismic forerunners of destruction
[JPRS-63441] N75-12468
Seismic events in the USSR in 1972
[FOA-C-20018-T1] N75-12470
SEISMOLOGY
Seismic magnitudes from explosions and earthquakes obtained at the Hagfors and Matsushiro Observatories
[FOA-C-20010-T1] N75-12465
Seismic events in the USSR in 1972
[FOA-C-20018-T1] N75-12470
SELF FOCUSING
Characterization of self-focusing mechanisms in laser materials
[UCRL-13597] N75-12308
Self-focusing and optical-field-induced effects in liquids and liquid crystals
[LBL-2592] N75-12767
SELF LUBRICATION
A self-lubricating bearing
[NASA-CASE-MFS-23009-1] N75-12328
SEMICONDUCTOR DEVICES
Design and fabrication of a versatile testing system for MNOS
[AD-785131] N75-12221
Achievements and development prospects of optoelectronics
N75-12837
Development of microwave semiconductors
N75-12840
SEMICONDUCTORS [MATERIALS]
Wave interactions in lossy periodic media
[AD-784660] N75-12826
SEMIEMPIRICAL EQUATIONS
Kamlets technique for predicting detonation velocity and pressure --- using semiempirical equations
[REPT-594] N75-12153
SENSORY STIMULATION
Neurophysiological aspects of interaction of the vestibular system with other body sensory systems
N75-12553
SERVICE LIFE
Proceedings of Quarterly Meeting of Life Cycle Cost Task Group of the Joint Services Data Exchange for Inertial Systems
[AD-785391] N75-11918
Program for establishing long-time flight service performance of composite materials in the center wing structure of C-130 aircraft. Phase 3: Fabrication
[NASA-CR-132495] N75-11937
SHAPED CHARGES
Fabrication and performance assessment of shaped charges --- damage capacity of the warmead
[DSL-546] N75-12155
SHEAR FLOW
A shear flow instability due to the finite ion gyroradius
[MPI-PAE/EXTRATERR-96] N75-12774
SHEAR STRENGTH
Shear buckling of square perforated plates
[NASA-CR-132548] N75-12364
SHIPS
Kivach-1 and Kivach-2 marine navigation radar sets --- development of improved shipborne radar for navigation
[AD-785338] N75-11920
SHOCK LOADS
Erosive destruction by cavitation flow
N75-12237
SHOCK TUBES
Annular arc accelerator shock tube
[NASA-CASE-NPO-13528-1] N75-11997
SHOCK WAVE INTERACTION
A computer programme for flowfield predictions in the interaction of a shock wave with a 90 degree bend
[REPT-58] N75-12640
SHOCK WAVES
Annular arc accelerator shock tube
[NASA-CASE-NPO-13528-1] N75-11997
Weak incident shock interactions with Mach 8 laminar boundary layers --- of flat plate
[NASA-TN-D-7835] N75-12243
Numerical solutions to the full viscous shock layer equations using an alternating direction implicit technique
[AD-785242] N75-12256
On the flow near a weak shock wave downstream of a nozzle throat --- numerical analysis of pressure gradient, streamline curvature, and shock wave curvature
[AD-785283] N75-12257
SHORELINES
Spatial and temporal variations in geometric and material properties of a natural beach --- a study of shoreline erosion in California
[AD-785572] N75-12389
SHORT HAUL AIRCRAFT
Parametric study of STOL short-haul engine cycles and operational techniques to minimize community noise impact
[NASA-CR-2486] N75-11910
Europlane QTOL: A European project proposal
N75-11941
Europlane QTOL: Design parameter tradeoffs
N75-11942
SHORT TAKEOFF AIRCRAFT
A wind tunnel investigation of the wake near the trailing edge of a deflected externally blown flap --- on a jet powered STOL transport aircraft
[NASA-TM-X-3079] N75-11896
Parametric study of STOL short-haul engine cycles and operational techniques to minimize community noise impact
[NASA-CR-2486] N75-11910
A motion-constraint logic for moving-base simulators based on variable filter parameters
[NASA-TN-D-7777] N75-11933
Short course on STOL aircraft technology and the community, volume 1
N75-11938
Vertical and short take-off demonstrated by the VAK 191 B
N75-11939
STOL aircraft design approaches: Noise considerations and performance tradeoffs --- lift devices
N75-11940
Europlane QTOL: A European project proposal
N75-11941
For STOL capability
N75-11943
Air cushion landing systems for aircraft --- short takeoff aircraft
N75-11944
Aspects of guidance and control for steep and curved approaches of STOL aircraft
N75-11945
Short course on STOL aircraft technology and the community, volume 2
N75-11946
Engines for commercial STOL transports --- high bypass turbofan
N75-11947
Propulsion concepts for STOL aircraft --- high bypass turbofan engines and air supply system for wings with internally blown flaps
N75-11948
SHROUDED NOZZLES
Some results of aeroacoustic research --- effect of shrouded nozzle configurations on jet noise
N75-11950
SIDELOBES
A low-sidelore antenna-radome study at Ka-band
[AD-785138] N75-12189
SIDEWINDER MISSILES
Specification for visual target acquisition system AN/AVG-8A [XJ-1] flight test program interface control document SH 4506-02-73
[AD-779909] N75-12769
SIGNAL GENERATORS
Signal conditioner test set
[NASA-CASE-KSC-10750-1] N75-12270

SIGNAL MEASUREMENT
Filters for oscillations of compex shape using varistors and varicaps
N75-12203

SIGNAL PROCESSING
Signal processing
[CEA-CONF-2584] N75-12180
Limiting statistics of fixed-point multiplication errors in digital filters with coefficients of arbitrary word length
[AD-784982] N75-12185
Filters for oscillations of compex shape using varistors and varicaps
N75-12203
Developing processing techniques for Skylab data -- Michigan test site
[E75-10040] N75-12409
Discrete-time domain analysis of a two-axis beam deflector
[AD-785133] N75-12773

SIGNAL RECEPTION
Filters for oscillations of compex shape using varistors and varicaps
N75-12203

SIGNAL TO NOISE RATIOS
Reception of distorted speech --- signal to noise ratios and speech intelligibility
[AD-777564] N75-12178

SILICATES
Mapping exposed silicate rock types and exposed ferric and ferrous compounds from a space platform
[E75-10008] N75-12392

SILICON
Method for determining minority carrier life in epitaxial silscon layers summary --- laser measurements
N75-12090
Debye-Waller measurements in silicon
[COO-1198-1075] N75-12107
Structural analysis on silicon after implantation of carbon ions in the energy region of 1 to 3 MeV
N75-12146

SILVER
Annealing of stacking-fault tetrahedra and frank dislocation loops in silver
[LBL-1172] N75-12132

SILVER ALLOYS
Investigation of solidification in zero-gravity environment: M553 sphere forming experiment. Nickel-silver alloy evaluation
[NASA-CR-129034] N75-12017

SIMULATORS
High power ac/dc variable R dynamic electrical load simulator
[NASA-CR-140331] N75-12199

SINGLE CRYSTALS
Debye-Waller measurements in silicon
[COO-1198-1075] N75-12107
The deposition of Er-Eu-Ga-F c0e garnet single crystal films
[AD-785511] N75-12111

SINGLE STAGE ROCKET VEHICLES
A method for determining optimum phasing of a multiphase propulsion system for a single-stage vehicle with linearized inert weight
[NASA-TN-D-7792] N75-12063

SINTERING
Preparation of substoichiometer titanium carbides and mixed titanium-tantalum carbides --- using powder metallurgy and sintering techniques
[CEA-N-1684] N75-12079

SKIN FRICTION
Theoretical prediction of thick wing and pylon-fuselage-fanpod-nacelle aerodynamic characteristics at subcritical speeds. Part 1: Theory and results
[NASA-CR-137578] N75-11935
Theoretical prediction of thick wing and pylon-fuselage-fanpod-nacelle aerodynamic characteristics at subcritical speeds. Part 2: Computer program description
[NASA-CR-137579] N75-11936

SKIN RESISTANCE
Error control in estimation of pilot stress by measuring skin resistance
N75-12610

SKYLAB PROGRAM
Skylab program payload integration. TO27 sample array
[NASA-CR-120531] N75-12011
Characterization of exothermic brazing components Skylab experiment M552
[NASA-CR-120518] N75-12015
M553 sphere forming experiment: Pure nickel specimen evaluation
[NASA-CR-129036] N75-12016
The final Skylab mission: Man at home and at work in space
[NASA-TM-X-70394] N75-12019
Skylab mission planning support through the use of a hybrid simulation
[NASA-TM-X-64889] N75-12037
Mechanical properties of Skylab thermal shield materials after prolonged ultraviolet irradiation
[NASA-TN-D-7844] N75-12144
Qualification test report bump protection hat [subassembly of T020/M509 head protective assembly]
[NASA-CR-140347] N75-12618

SLEDS
Environmental investigation of pilot propulsion test sled
[AD-785134] N75-12010

SLEEP
Effect of 30-day hypokinesia on the dynamics of higher nervous activity and sleep of an operator
N75-12566
Long range air-to-air refuelling: A study of duty and sleep patterns
N75-12600

SMOG
Rate of formation and dissipation of smog in open industrial quarries
N75-12515

SNOW COVER
Calculating the depth of the freezing of swamps of the flat bog type in the example of the Tarman bog
N75-12522

SOCIAL FACTORS
Remote sensing utility in a disaster struck urban environment
[NASA-CR-140801] N75-12858

SOCIOLOGY
Individual differences in an organizational setting: Interrelationships and influences
[AD-785003] N75-12615

SODIUM
High-temperature thermodynamic properties of sodium
[ANL-8095] N75-12102
Analysis of VUV and X-ray lasers pumped by a traveling-wave source
[AD-784995] N75-12318

SODIUM CHLORIDES
Information storage in photodichroic crystals
[AD-785005] N75-12109

SOIL MECHANICS
Development and applications of the air cushion landing system --- to reduce ground pressure in conditions of poor soil strength
N75-11952

SOIL MOISTURE
Detection of moisture and moisture related phenomena from Skylab --- Kansas, Oklahoma, and Arkansas
[E75-10035] N75-12405
Empirical model of the root system of winter wheat considering weather conditions and the soil moisture distribution by layers
N75-12499

SOIL SCIENCE
Develop techniques and procedures, using multispectral systems, to identify from remotely sensed data the physical and thermal characteristics of plants and soil --- Southern Texas
[E75-10012] N75-12394
Develop techniques and procedures, using multispectral systems, to identify from remotely sensed data the physical and thermal characteristics of plants and soil
[E75-10033] N75-12403
Irrigation scheduling, freeze warning and soil salinity detecting --- Cameron County, Texas
[E75-10046] N75-12414

SOLAR ARRAYS
Balloon platform for extended-life astronomy research
N75-12748

SOLAR CELLS
Lithium-doped solar cell pilot line fabrication and test programs
[NASA-CR-140843] N75-12433

SOLAR CORONA
Balloon-borne infrared coronagraph --- application to solar observations
N75-12736

SOLAR ENERGY
Thermostatically controlled nontracking type solar energy concentrator
[NASA-CASE-NPO-13497-1] N75-12429
Our prodigal sun --- solar energy technology
[NASA-EP-118] N75-12885
Calculating the daily variations of solar energy incident on flat plates
[ORNL-TM-4564] N75-12886

SOLAR FLARES
The relationship between solar flares and solar sector boundaries
[NASA-CR-140856] N75-12882

SOLAR GENERATORS
Power processor design considerations for a solar electric propulsion spacecraft
[NASA-CR-140842] N75-12064

SOLAR INSTRUMENTS
The Liege-balloon program --- balloon-borne instruments for high-spectral resolution observations of the sun
N75-12739

SOLAR PROPULSION
Power processor design considerations for a solar electric propulsion spacecraft
[NASA-CR-140842] N75-12064

SOLAR PROTONS
Optimization of time variable thickness of radiation protection against solar flare protons --- manned spacecraft shielding
N75-12567

SOLAR RADIATION
Estimates of radiation exposure from solar cosmic rays in SST altitudes
[NASA-TM-X-71990] N75-12883

SOLAR SPECTRA
Refinement in black chrome for use as a solar selective coating
[NASA-TM-X-3136] N75-12329
The Liege-balloon program --- balloon-borne instruments for high-spectral resolution observations of the sun
N75-12739

SOLAR SYSTEM
Titius-Bode law and the possibility of recent large scale evolution in the solar system
[LA-UR-74-919] N75-12876
Unified model of solar system and galaxy formation based on explosive fragmentation
[LA-5364] N75-12877

SOLAR WIND
Microscale Alfven waves in the solar wind at 1 AU
[NASA-TM-X-70793] N75-12874
Directional discontinuities from Mariner 5 and solar wind structure
[NASA-TM-X-70733] N75-12884

SOLDERED JOINTS
Soldering large area joints in vacuum
[SLA-73-1075] N75-12335

SOLID PROPELLANT IGNITION
A unified theory of solid propellant ignition. Part 1: Development of mathematical model
[AD-785231] N75-12158
A unified theory of solid propellant ignition. Part 2: Computer program
[AD-785232] N75-12159

SOLID PROPELLANT ROCKET ENGINES
Investigation of the starting transients of high performance solid-propellant motors
[NASA-CR-140800] N75-12060
High chamber pressure blast tube and nozzle material evaluation, volume 1
[AD-780531/0] N75-12071

SOLID ROCKET PROPELLANTS
A unified theory of solid propellant ignition. Part 1: Development of mathematical model
[AD-785231] N75-12158
A unified theory of solid propellant ignition. Part 2: Computer program
[AD-785232] N75-12159

SOLID STATE DEVICES
Texas Biannual of Electronics Research No. 19 --- progress in solid state electronics and information systems
[AD-784968] N75-12218
Development of solid-state microwave electronics
N75-12838

SOLIDIFICATION
Investigation of solidification in zero-gravity environment: M553 sphere forming experiment. Nickel-silver alloy evaluation
[NASA-CR-129034] N75-12017

SOLIDS
Dynamic constitutive equations --- involving stress wave propagation through solid materials
[SLA-74-5438] N75-12682
Transport optical and magnetic properties of solids
[AD-785429] N75-12710

SOLUBILITY
Solubility of H2 in RCo3 compounds
[COO-3429-20] N75-12108

SOUND WAVES
Directivity of hydroacoustic antennas
[JPRS-63554] N75-12204
Proceedings of the Canadian Workshop on acoustic surface waves
[CRC-1260] N75-12696
Introduction to the proceedings of the Canadian workshop on acoustic surface waves
N75-12697
Interdigital transducers and acoustic-surface-wave filters
N75-12698
Fabrication technology and materials --- for surface acoustic wave devices
N75-12699
Systems applications and implementation 1: Communications --- employing surface acoustic wave devices
N75-12700
Systems applications and implementation 2: Radar -- employing surface acoustic wave devices
N75-12701
Optical probing of surface waves
N75-12703

SOUTHERN CALIFORNIA
Remote sensing geophysics from Skylab --- Southern California and Nevada minerals and rocks
[E75-10045] N75-12413
SPACE CHARGE
Space charge limiting of bounded relativistic electron beams
[UCID-16527] N75-12725
SPACE ENVIRONMENT SIMULATION
Theoretical investigations on the coaxial accelerator with compression coil --- for the simulation of micrometeorides
N75-12782
SPACE EXPLORATION
Visiting the solar family --- U.S.S.R. and United States of America unmanned spacecraft and planetary probes
[NASA-TT-F-14795] N75-12013
SPACE FLIGHT STRESS
Space biology and aerospace medicine, volume 8, no. 5, 1974
[JPRS-63603] N75-12552
SPACE MANUFACTURING
Characterization of exothermic brazing components Skylab experiment M552
[NASA-CR-120518] N75-12015
Investigation of solidification in zero-gravity environment: M553 sphere forming experiment. Nickel-silver alloy evaluation
[NASA-CR-129034] N75-12017
The final Skylab mission: Man at home and at work in space
[NASA-TM-X-70394] N75-12019
SPACE MISSIONS
Phase A conceptual design study of the Atmospheric, Magnetospheric and Plasmas in Space [AMPS] payload
[NASA-TM-X-64895] N75-12014
An assessment of the Instrument Pointing Subsystems [IPS] requirements for spacelab missions
[NASA-TM-X-64896] N75-12018
The final Skylab mission: Man at home and at work in space
[NASA-TM-X-70394] N75-12019
SPACE PERCEPTION
Function of perception of space coordinates during vestibular trained by active, passive and complex methods
N75-12563
SPACE RATIONS
Non-caking freeze dried applesauce
[NASA-CR-140938] N75-12621
SPACE SHUTTLE BOOSTERS
Space shuttle launch vehicle [13 P-OTS] strut support interference effects study in the Rockwell International 7- by 7-foot trisonic wind tunnel [IA68]
[NASA-CR-134427] N75-12030
SPACE SHUTTLE ORBITERS
Space shuttle orbiter vehicle star tracker test program plan
[NASA-CR-140349] N75-12025
Results of investigations on an 0.015-scale 140A/B configuration of the Rockwell International space shuttle orbiter [model 49-O] in the NASA/Ames Research Center 3.5-foot hypersonic wind tunnel [OA36]
[NASA-CR-134430] N75-12031
Results of an experimental aerodynamic investigation to obtain static stability and control characteristics of the SSV configurations: The 2A[VL70-000089B] model 1 and 3[VL70-000139B] model 2 orbiter at Mach numbers of 2.5, 3.9 and 4.6 in the NASA LaRC 4 X 4-foot UPWT [OA44]
[NASA-CR-134411] N75-12033
Effects of air breathing engine plumes on SSV orbiter subsonic wing pressure distribution [OA57B], volume 1
[NASA-CR-134416] N75-12034
Effects of wing/elevon gap sealing flapper doors on orbiter elevon effectiveness of model 16-0 in the NAAL 7.75 by 11 foot continuous flow wind tunnel [OA119A]
[NASA-CR-134421] N75-12035
Effects of the air breathing engine plumes on SSV orbiter subsonic wing pressure distributions [OA57A]
[NASA-CR-134414] N75-12040
SPACE SHUTTLES
Reentry aerodynamic characteristics of a space shuttle solid rocket booster model 449 tested in MSFC 14 by 14 inch TWT [SA26F]
[NASA-CR-134435] N75-12022
Aerodynamic results of wind tunnel separation tests on a 0.01-scale model [32-OTS] space shuttle integrated vehicle in the AEDC-VKF-SWTA [IA57]
[NASA-CR-134401] N75-12029
A hypersonic force and moment test of a 0.006 scale model [466] of the 330.2 inch diameter external tank in the Ames Research Center 3.5 foot hypersonic wind tunnel [TA9F] --- space shuttle development
[NASA-CR-134425] N75-12032
Study of roles of remote manipulator systems and EVA for shuttle mission support, volume 1
[NASA-CR-140364] N75-12036
Design of the software development and verification system [SWDVS] for shuttle NASA study task 35
[NASA-CR-140341] N75-12038
Space shuttle maneuvering engine reusable thrust chamber program. Task 11: Low epsilon stability test report data dump
[NASA-CR-140358] N75-12069
Department of defense space shuttle on-board software requirements
[AD-785123] N75-12648
SPACE STATIONS
Design, processing, and testing of LSI arrays for space station
[NASA-CR-120539] N75-12437
SPACE SUITS
Wearing of anti-G suit by persons with reduced orthostatic stability
N75-12565
SPACEBORNE PHOTOGRAPHY
Dust storms according to data of space research --- spaceborne photography of arid zones
[NASA-TT-F-16021] N75-12463
SPACECRAFT CONTAMINATION
Results of induced atmosphere measurements from the Apollo program --- possible effects of the induced environment in the vicinity of manned spacecraft on future manned laboratory experiments
[NASA-TN-D-7854] N75-12875
SPACECRAFT CONTROL
Results of an experimental aerodynamic investigation to obtain static stability and control characteristics of the SSV configurations: The 2A[VL70-000089B] model 1 and 3[VL70-000139B] model 2 orbiter at Mach numbers of 2.5, 3.9 and 4.6 in the NASA LaRC 4 X 4-foot UPWT [OA44]
[NASA-CR-134411] N75-12033
The SAS-D nutation control system
[NASA-TM-X-65944] N75-12039
SPACECRAFT INSTRUMENTS
An assessment of the Instrument Pointing Subsystems [IPS] requirements for spacelab missions
[NASA-TM-X-64896] N75-12018
SPACECRAFT ORBITS
AAFE man-made noise experiment project. Volume 1: Introduction experiment definition and requirements
[NASA-CR-132509] N75-12168
AAFE man-made noise experiment project. Volume 2: Project and experiment discussions
[NASA-CR-132510] N75-12169
AAFE man-made noise experiment project. Volume 3: Appendices
[NASA-CR-132511] N75-12170
SPACECRAFT POWER SUPPLIES
Power processor design considerations for a solar electric propulsion spacecraft
[NASA-CR-140842] N75-12064
SPACECRAFT PROPULSION
A method for determining optimum phasing of a multiphase propulsion system for a single-stage vehicle with linearized inert weight
[NASA-TN-D-7792] N75-12063
SPACECRAFT STABILITY
The analysis and design of satellite stabilisation systems using ion propulsion
[RAE-LIB-TRANS-1775] N75-12027
SPACECRAFT STRUCTURES
Structural heat pipe --- for spacecraft wall thermal insulation system
[NASA-CASE-GSC-11619-1] N75-12222
SPACELAB
Phase A conceptual design study of the Atmospheric, Magnetospheric and Plasmas in Space [AMPS] payload
[NASA-TM-X-64895] N75-12014
An assessment of the Instrument Pointing Subsystems [IPS] requirements for spacelab missions
[NASA-TM-X-64896] N75-12018
SPATIAL DISTRIBUTION
Atmospheric moisture parameterization --- spatial distribution of atmospheric moisture
[AD-784814] N75-12476
SPECTRAL BANDS
Stellar content of the nuclei of elliptical galaxies determined from 2.3 micron CO band strengths
[NASA-CR-140859] N75-12861
SPECTRAL REFLECTANCE
Recordings of the spectral-radio-meter SIGNE during the summer of 1972
[FOA-2-C-2577-E1] N75-12283
Refinement in black chrome for use as a solar selective coating
[NASA-TM-X-3136] N75-12329
SPECTROMETERS
Power supply for Helmholtz coils --- for use in spectrometer
[AREAEE-177] N75-12212
Translations on Eastern Europe: Scientific affairs, no. 440 --- including radiowave measurement of solar corona and thyristor dc electric drive
[JPRS-63573] N75-12832
Operation of Polish equipment used on Interkosmos space satellite described --- specifically - radiospectrograph onboard Intercosmos-Kopernik 500 satellite
N75-12833
SPECTROPHOTOMETERS
A method for measuring small transmittances and reflectances with the Cary 14R spectrophotometer-spectroradiometer
[DSL-TN-334] N75-12764
SPECTRORADIOMETERS
In situ spectroradiometric calibration of EREP imagery and oceanography of Block Island Sound --- Arizona geology
[E75-10042] N75-12411
A method for measuring small transmittances and reflectances with the Cary 14R spectrophotometer-spectroradiometer
[DSL-TN-334] N75-12764
SPECTROSCOPIC ANALYSIS
Microwave and infrared observations of molecular spectra in Comet Kohoutek
[NASA-CR-140955] N75-12865
SPECTRUM ANALYSIS
On the form of spectra of radar echoes from precipitation
[FOA-P-C-8351-M7] N75-12528
SPEECH
Adaptive differential PCM speech transmission
[AD-785124] N75-12191
SPEECH RECOGNITION
Reception of distorted speech --- signal to noise ratios and speech intelligibility
[AD-777564] N75-12178
Natural communication with Computers 4
[AD-784231] N75-12667
SPEED CONTROL
Thyristor dc electric drive with time-proportional speed control
N75-12834
SPHERES
M553 sphere forming experiment: Pure nickel specimen evaluation
[NASA-CR-129036] N75-12016
SPHERICAL SHELLS
Development of an improved technique for forming acrylic spheres --- application to underwater habitation and exploration
[AD-784113] N75-12337
SPIN STABILIZATION
Theoretical study of system dynamics --- momentum wheel for satellite despinning
N75-12048
SPIN TESTS
The 20,000-RPM centrifuge --- design of portable spin test equipment
[SLA-74-204] N75-12336
SPINAL CORD
Error control in estimation of pilot stress by measuring skin resistance
N75-12610
SPODUMENE
Strength and durability of a glass-ceramic containing spodumene crystals
[AD-783087/0] N75-12151
SPRAY NOZZLES
Performance and durability of improved air-atomizing splash-cone fuel nozzles
[NASA-TM-X-3156] N75-12334
STABILITY
The stability and response of linear systems. Part 2: Methods of displaying stability characteristics
[ESDU-74020-PT-2] N75-12673
STABILITY DERIVATIVES
A hypersonic force and moment test of a 0.006 scale model [466] of the 330.2 inch diameter external tank in the Ames Research Center 3.5 foot hypersonic wind tunnel [TA9F] --- space shuttle development
[NASA-CR-134425] N75-12032
STABILITY TESTS
Space shuttle maneuvering engine reusable thrust chamber program. Task 11: Low epsilon stability test report data dump
[NASA-CR-140358] N75-12069
STABILIZED PLATFORMS
Depot requirements for base level data on aircraft inertial platforms
[AD-785443] N75-11914
An assessment of the Instrument Pointing Subsystems [IPS] requirements for spacelab missions
[NASA-TM-X-64896] N75-12018
Design and performance of a 39cm balloon-borne telescope
N75-12742
An orientable, stabilized balloon-borne gondola for around-the-world flights
N75-12743
Balloon platform for extended-life astronomy research
N75-12748
A general purpose stabilised balloon platform
N75-12760
STAGE SEPARATION
Aerodynamic results of wind tunnel separation tests on a 0.01-scale model [32-OTS] space shuttle integrated vehicle in the AEDC-VKF-SWTA [IA57]
[NASA-CR-134401] N75-12029
STAINLESS STEELS
Application of eddy currents to detect corrosion in copper and stainless steel tubing
[K-1860] N75-12134

Acoustic emissions and stress-corrosion cracking in high-strength alloys
[AD-785009] N75-12136
Properties of thick type 308 stainless steel welds with controlled residual elements
[ORNL-TM-4206] N75-12369

STANDARDS
Calibration of the DSL 50 ton-force [500 kN] single-lever primary standard of force
[DSL-551] N75-12331
Energy and environmental standards --- environmental standards and energy policy
[GPO-37-171] N75-12431
Automobile emission standards
[S-REPT-93-598] N75-12452

STAR DISTRIBUTION
Stellar content of the nuclei of elliptical galaxies determined from 2.3 micron CO band strengths
[NASA-CR-140859] N75-12861

STAR TRACKERS
Space shuttle orbiter vehicle star tracker test program plan
[NASA-CR-140349] N75-12025
Stellar tracking attitude reference system
[NASA-CR-139158] N75-12026
Design and performance of a 39cm balloon-borne telescope
N75-12742
An orientable, stabilized balloon-borne gondola for around-the-world flights
N75-12743
AIROscope: Ames infrared balloon-borne telescope
N75-12747
The stellar and solar tracking system of the Geneva Observatory gondola
N75-12753
Balloon-borne ultraviolet stellar spectrometer: Acquisition, tracking and command systems
N75-12755
AIROscope stellar acquisition
N75-12757
Balloon infrared astronomy platform [BIRAP] --- development and characteristics of a balloon-borne attitude control system
N75-12759
A general purpose stabilised balloon platform
N75-12760

STATIC PRESSURE
Effect of shock impingement on heat transfer. Part 2: Effect of shear layer impingement on pressure and heat transfer rate distribution around a cylinder
[AD-778962] N75-12269

STATIC STABILITY
Results of an experimental aerodynamic investigation to obtain static stability and control characteristics of the SSV configurations: The 2A[VL70-000089B] model 1 and 3[VL70-000139B] model 2 orbiter at Mach numbers of 2.5, 3.9 and 4.6 in the NASA LaRC 4 X 4-foot UPWT [OA44]
[NASA-CR-134411] N75-12033

STATISTICAL ANALYSIS
Optimal time assimulation of satellite measurement data for statistical analysis of meteorological fields
N75-12492

STATISTICAL DISTRIBUTIONS
A unified statistical model of the premixed turbulent flame
[AASU-335] N75-12094

STATISTICAL TESTS
Methods for the determination of the probability distribution and/or the parameters which best describe a set of test data
[AD-785497] N75-12691

STATOR BLADES
The torques occurring in the starting of polyphase induction-motors with squirrel-cage rotors
[RAE-LIB-TRANS-1782] N75-12211

STEADY STATE
Transient and steady-state velocity of domain walls for a complete range of drive fields
[NASA-CR-140942] N75-12694

STEELS
The resistance of selected high strength alloys to embrittlement by a hydrogen environment --- iron and cobalt base alloys
[NASA-CR-140957] N75-12115
The effect of hafnium in unalloyed construction steels similar to St 52-3, considering especially the hot forming behavior of sulfidic inclusions
N75-12121
Fifth International Congress on Metal Corrosion
[FOA-1-C-1493-G3[G1]] N75-12129

STELLAR ATMOSPHERES
Nucleosynthesis of light elements in stellar atmospheres and in interstellar matter
N75-12868

STELLAR MASS
Mass and stability of rigidly rotating relativistic polytropes
[COO-3071-95] N75-12864

STELLAR ROTATION
Mass and stability of rigidly rotating relativistic polytropes
[COO-3071-95] N75-12864

STERILIZATION EFFECTS
Environmental microbiology as related to planetary quarantine --- synergetic effect of heat and radiation
[NASA-CR-140941] N75-12622

STIFFNESS
Ratio of axial and radial stiffness in an axisymmetric magnetic bearing
N75-12044
Study of repulsion bearings --- ratio of axial and radial stiffness
N75-12045

STIMULATED EMISSION
Stimulated chemiluminescence in the alkalihalides
[TN-336] N75-12091

STOCHASTIC PROCESSES
The effect of stochastic interferences on the acoustic holographic imagery of objects
N75-12284

STOICHIOMETRY
Preparation of substoichiometer titanium carbides and mixed titanium-tantalum carbides --- using powder metallurgy and sintering techniques
[CEA-N-1684] N75-12079

STORAGE
Metal hydrides as hydrogen storage media
[BNL-18887] N75-12440

STORAGE STABILITY
Storage stability of federal specification gasolines
[AD-784282] N75-12160

STORMS [METEOROLOGY]
Dust storms according to data of space research --- spaceborne photography of arid zones
[NASA-TT-F-16021] N75-12463

STRAIN GAGES
Strain gauge ambiguity sensor for segmented mirror active optical system
[NASA-CASE-MFS-20506-1] N75-12273

STRAIN HARDENING
Thermal ratcheting of a beam
[ANL-CT-74-16] N75-12371

STRANGENESS
Absence of strangeness-changing, neutral current effects from the symmetric quark model
N75-12813

STRATA
Stratification phenomena in the positive column of a low pressure oxygen discharge
[AD-783054] N75-12803

STRATEGY
Some basic properties of the payoffs defined by closed-loop strategies
[AD-784434] N75-12672

STRATOSPHERE
Quantitative determination of stratospheric aerosol characteristics
[E75-10010] N75-12393
Relation of the wind and baric fields in the stratosphere and the lower mesosphere of the tropical zone of the Northern Hemisphere
N75-12493
Atmospheric processes in the 30-60 km layer in 1971 - 1973
N75-12494
Complex studies of the stratospheric aerosol --- optical properties of aerosols and effects on stratospheric radiation
N75-12509

STRESS [BIOLOGY]
Psychophysiological stress investigations of an instrument-coordination analyzer
N75-12607

STRESS [PHYSIOLOGY]
Morphocytochemical reaction of the suprarenals and thymic-lymphatic system of rats after termination of hypokinesia
N75-12556

STRESS [PSYCHOLOGY]
New or newly tested methods for the assessment of pilots' workload --- conference
[DLR-MITT-74-19] N75-12605
Quantitative analysis of psychophysical stress in operating complex dynamic systems
N75-12606
Heart rate and sinusoidal arrythmia Measurement in view of objectivating concentration and stress in control tasks
N75-12608

STRESS ANALYSIS
Development of stretch fabric for parachute canopies
[AD-785195] N75-11902
Alternating method applied to edge and surface crack problems
[NASA-CR-140846] N75-12353
Stress analysis of a radial nozzle attached to a cylindrical shell under internal pressure
[ORNL-TM-4269] N75-12366
A three dimensional variable node isoparametric solid element --- linear stress analysis
[AD-785353] N75-12377

STRESS CONCENTRATION
Contribution to the exact determination of the notch factor in screwed nut joints
N75-12327

STRESS CORROSION
Effect of exposure cycle on hot salt stress corrosion of a titanium alloy
[NASA-TM-X-3145] N75-12128
Observations on the stress corrosion cracking of an Al-5 percent Zn-2.5 percent Mg ternary and various quarternary alloys
[AD-785020] N75-12142

STRESS CORROSION CRACKING
Prevention and control of subcritical crack growth in high-strength metals
[AD-785233] N75-12135
Acoustic emissions and stress-corrosion cracking in high-strength alloys
[AD-785009] N75-12136
Calculation of incipient fracture at a shrink-fit pin interference
[SLL-73-63] N75-12367
Load and environment interactions in fatigue crack growth
[AD-785249] N75-12374

STRESS PROPAGATION
Dynamic constitutive equations --- involving stress wave propagation through solid materials
[SLA-74-5438] N75-12682

STRESS WAVES
Acoustic emissions and stress-corrosion cracking in high-strength alloys
[AD-785009] N75-12136

STRESSES
Filamentary composite laminates subjected to biaxial stress fields
[AD-785362] N75-12081
The characterization of the reversion stress for NiTi
[AD-784761] N75-12373

STRIP MINING
Applicability of Skylab remote sensing for detection and monitoring of surface mining activities --- strip mining and reclamation in Kentucky and Tennessee
[E75-10038] N75-12407

STRIP TRANSMISSION LINES
Transmission models for microwave microelectronics using thin films on ferrimagnetic substrates
[REPT-1230/73-143] N75-12192

STRUCTURAL ANALYSIS
Use of cholesteric liquid crystals for locating voids in adhesively bonded helicopter rotor blades
[AD-785502] N75-11963
Examination of an object from space
[FOA-1-A-1562-F5] N75-12023
Structural optimization
[AGARD-LS-70] N75-12357
Use of optimality criteria methods for large scale systems
N75-12358
The use of geometric programming methods for structural optimization
N75-12360
Structural mechanics of skewed thin wall systems
[AD-785116] N75-12376

STRUCTURAL DESIGN
In-airframe ground runup noise suppressor program
[AD-785246] N75-11986
Design and development testing of free planet transmission concept
[AD-782857/7] N75-12338
Seminar on load calculations
[REPT-72-6] N75-12372

STRUCTURAL DESIGN CRITERIA
Europlane QTOL: A European project proposal
N75-11941
Structural optimization
[AGARD-LS-70] N75-12357
Use of optimality criteria methods for large scale systems
N75-12358
Some approximation concepts for structural synthesis
[NASA-CR-140937] N75-12359
The use of geometric programming methods for structural optimization
N75-12360
Sizing of complex structure by the integration of several different optimal design algorithms
[L-9738] N75-12361
A discretized program for the optimal design of complex structures
N75-12362

STRUCTURAL ENGINEERING
Structural optimization
[AGARD-LS-70] N75-12357
A discretized program for the optimal design of complex structures
N75-12362

STRUCTURAL MEMBERS
Some approximation concepts for structural synthesis
[NASA-CR-140937] N75-12359
A discretized program for the optimal design of complex structures
N75-12362

STRUCTURAL PROPERTIES [GEOLOGY]
Lakes of Mongolia
N75-12525

STRUCTURAL STABILITY
Alternating method applied to edge and surface crack problems
[NASA-CR-140846] N75-12353
Linear stabilization theory for curved rods N75-12356
Some approximation concepts for structural synthesis
[NASA-CR-140937] N75-12359
STRUCTURAL VIBRATION
Viking Mars lander 1975 dynamic test model/orbiter developmental test model forced vibration test
[NASA-CR-140851] N75-12028
STRUTS
A spectrum truncation and damage tolerance study associated with the C-5A outboard pylon aft truss lugs
[AD-785196] N75-11955
Space shuttle launch vehicle [13 P-OTS] strut support interference effects study in the Rockwell International 7- by 7-foot trisonic wind tunnel [IA68]
[NASA-CR-134427] N75-12030
SUBMARINES
A low-sidelore antenna-radome study at Ka-band
[AD-785138] N75-12189
SUBROUTINES
Supporting program and program system for the assembly program in Tiros
[FOA-1-C-1470-C4] N75-12633
FORTRAN dialects: A selection
[FOA-1-C-1500-M4] N75-12636
Flexible table printing subroutines in FORTRAN
[FOA-2-C-2590-E5] N75-12657
A program for listing card indices for A4 reports
[FOA-2-C-2589-E5] N75-12658
SUBSONIC FLOW
Subsonic wind tunnel investigation of a twin-engine attack airplane model having nonmetric powered nacelles
[NASA-TN-D-7742] N75-11932
Effect of blade row geometry on axial flow rotor unsteady response to inflow distortions
[AD-785276] N75-11991
Effects of air breathing engine plumes on SSV orbiter subsonic wing pressure distribution [OA57B], volume 1
[NASA-CR-134416] N75-12034
SUBSONIC SPEED
Cascade tests of serrated leading edge blading at high subsonic speeds
[NASA-CR-2472] N75-11983
SUN
Our prodigal sun --- solar energy technology
[NASA-EP-118] N75-12885
SUPERCONDUCTING MAGNETS
Superconducting magnetic energy storage --- theta pinch thermonuclear fusion test reactor
[LA-UR-74-737] N75-12814
SUPERCONDUCTING POWER TRANSMISSION
Conductor tests for dc superconducting power transmission --- cryogenic and electrical properties
[LA-UR-74-724] N75-12213
SUPERCONDUCTIVITY
Superconducting properties of bulk and thin film A15 compounds
[AD-785014] N75-12818
SUPERCONDUCTORS
Materials research in support of superconducting machinery
[AD-780596/3] N75-12138
Type 2 film superconductors for power applications
[AD-785534] N75-12220
AC electronic tunneling at optical frequencies
[NASA-CR-140802] N75-12812
Electronic structure of hard superconductors --- establishment of cleaning procedures of niobium
[AD-785421] N75-12821
Structure dependent properties of thin film superconductors
[AD-785424] N75-12822
Intermediate state in superconductors
[AD-785484] N75-12825
SUPERCRITICAL FLOW
Subcritical and supercritical compressible flows without shock in vane meshes
[AAAF-NT-74-1] N75-12225
SUPERSONIC AIRCRAFT
Numerical methods for the design and analysis of wings at supersonic speeds
[NASA-TN-D-7713] N75-11930
SUPERSONIC COMBUSTION RAMJET ENGINES
A forebody design technique for highly integrated bottom-mounted scramjets with application to a hypersonic research airplane
[NASA-TM-X-71971] N75-11973
Turbulent heat transfer prediction method for application to scramjet engines
[NASA-TN-D-7810] N75-12234
SUPERSONIC FLOW
Numerical study of separated turbulent flows N75-12226
Effect of interjet spacing on mixing of multiple coaxial jets in supersonic flow
[NASA-CR-2469] N75-12248
Effect of shock impingement on heat transfer. Part 2: Effect of shear layer impingement on pressure and heat transfer rate distribution around a cylinder
[AD-778962] N75-12269
On producing a CO2-laser medium for high output with an electric discharge in a supersonic flow N75-12791
Supersonic expansion of nonequilibrium plasmas --- of ionized gas
[AD-785434] N75-12804
SUPERSONIC INLETS
Continuous-output terminal-shock-position sensor for mixed-compression inlets evaluated in wind tunnel tests of YF-12 aircraft inlet
[NASA-TM-X-3144] N75-11971
SUPERSONIC JET FLOW
Clustering of water on hydrated protons in a supersonic free jet expansion
[AD-785284] N75-12263
SUPERSONIC NOZZLES
Status of flow separation prediction in liquid propellant rocket nozzles
[NASA-TM-X-64890] N75-12061
SUPERSONIC SPEEDS
Sweep effect on the drag of rows of perpendicular circular cylinders in a laminar boundary layer at supersonic free-stream velocities
[NASA-TN-D-7812] N75-12235
SUPERSONIC TRANSPORTS
Estimates of radiation exposure from solar cosmic rays in SST altitudes
[NASA-TM-X-71990] N75-12883
SURFACE CRACKS
Alternating method applied to edge and surface crack problems
[NASA-CR-140846] N75-12353
SURFACE ENERGY
Intermediate state in superconductors
[AD-785484] N75-12825
SURFACE PROPERTIES
Apparatus for microbiological sampling --- including automatic swabbing
[NASA-CASE-LAR-11069-1] N75-12272
Structure dependent properties of thin film superconductors
[AD-785424] N75-12822
Surface and bulk electronic properties of magnetic materials --- such as pure and impure insulators
[AD-785426] N75-12824
SURFACE REACTIONS
Some surface properties of Apollo 17 soils
[CONF-740321-3] N75-12881
SURFACE WAVES
Surface acoustic wave notch filter using a phase-shifting technique
[AD-785569] N75-12214
SURGES
Experiments on conventional excess voltage transient protection as a protection against an EMP transient
[FOA-4-C-4526-A3] N75-12207
SURVEILLANCE
Airborne vapor surveillance system
[AD-785585] N75-12459
SURVEYS
Ground effect devices for transport of personnel and goods over short distances using air suspension
[FOA-2-A-2566-F8[F3]] N75-11897
Chemical reaction engineering
[FOA-1-C-1515-H3] N75-12073
SWEPT WINGS
Effects of leading edge sweep angle and design lift coefficient on performance of a modified arrow wing at a design Mach number of 2.6
[NASA-TN-D-7753] N75-11893
SWITCHING CIRCUITS
Possibilities for the construction of various types of multi-value adders from mixers, switches, and spectrotrons
[AD-781323/1] N75-12626
Multi-computer multiple data path hardware exchange system
[NASA-CASE-NPO-13422-1] N75-12652
SYMBOLS
Complex psychophysiological evaluation of the readability of symbolic information
[RAE-LIB-TRANS-1777] N75-12575
SYNOPTIC METEOROLOGY
Weather forecast and forecast of the agrometeorological conditions for the Fall of 1974 [26 August to 15 October]
N75-12527
SYNTAX
On high level digital system design
[AD-785570] N75-12666
SYSTEM EFFECTIVENESS
Systems simulation: A global approach to aircrew workload --- computerized systems analysis N75-12588
SYSTEMS ANALYSIS
Proceedings of Quarterly Meeting of Life Cycle Cost Task Group of the Joint Services Data Exchange for Inertial Systems
[AD-785391] N75-11918
An advanced air traffic management concept based on extensions of the upgraded third generation ATC system. System B: ATC automation analysis
[AD-785312] N75-11923
Principles of the reliability theory of mechanical systems, chapter 8
[AD-785209] N75-12349
SYSTEMS ENGINEERING
Use of optimality criteria methods for large scale systems N75-12358
Earth resources sensor data handling system: NASA JSC version
[NASA-CR-140334] N75-12418
Systems applications and implementation 1: Communications --- employing surface acoustic wave devices N75-12700
Systems applications and implementation 2: Radar --- employing surface acoustic wave devices N75-12701

T

T TAIL SURFACES
Aerodynamic roll damping of a T-tail transport configuration
[NASA-TM-X-3115] N75-11898
TABLES [DATA]
Oceanographical observations from Danish lightvessels and coastal stations, 1973
[ISBN-87-7478-097-2] N75-12539
TABULATION PROCESSES
A program for listing card indices for A4 reports
[FOA-2-C-2589-E5] N75-12658
TAIL ASSEMBLIES
A wind-tunnel investigation of parameters affecting helicopter directional control at low speeds in ground effect
[NASA-TN-D-7694] N75-11931
TAKEOFF RUNS
Air cushion landing systems for aircraft --- short takeoff aircraft N75-11944
TAPE RECORDERS
Digital data collection with A/D-transducer DEC AF01, tape player AMPEX FR1300 and computer pdp-8/I
[FOA-1-C-1497-D1] N75-12288
TARGET ACQUISITION
Specification for visual target acquisition system AN/AVG-8A [XJ-1] flight test program interface control document SH 4506-02-73
[AD-779909] N75-12769
TARGET DRONE AIRCRAFT
Radar signature measurements of BQM-34A and BQM-34F target drones, volume 1A
[AD-785219] N75-12182
TASK COMPLEXITY
A flight simulator study of missile control performance as a function of concurrent workload --- task complexity effects N75-12592
Quantitative analysis of psychophysical stress in operating complex dynamic systems N75-12606
TAYLOR INSTABILITY
Two-dimensional calculations of high density laser induced fusion: Study of symmetry and Taylor instability
[UCRL-74926] N75-12302
TDR SATELLITES
TDRSS telecommunications study. Phase 1: Final report
[NASA-CR-139157] N75-12177
TEA LASERS
Measure of the characteristics of TEA CO2 amplifier and experimental study of the propagation of a laser pulse with an exponential front in the amplifying media and absorption at 10.6 microns
[DREV-R-710/74] N75-12301
TECHNOLOGICAL FORECASTING
Nuclear power growth, 1974 - 2000 --- forecasting future reactor technology
[WASH-1139-74] N75-12723
TECHNOLOGY ASSESSMENT
Characterization and evaluation of materials for magnetic domain propagation [orthoferrites, garnets]
[REPT-8562] N75-12194
Is MHD dead? --- in terms of its uses in energy conversion and combustion technology N75-12780
TECHNOLOGY TRANSFER
Technology and community development materials processing, and electrical and nuclear technology --- technical research center of Finland N75-12695
TECHNOLOGY UTILIZATION
Fabrication technology: A compilation --- cutting and working with metals
[NASA-SP-5978[02]] N75-12162

Electronic equipment, systems, and techniques: A compilation
[NASA-SP-5972[01]] N75-12200
Measurement, testing, and safety technology: A compilation
[NASA-SP-5976[01]] N75-12343
A survey of LNG technological needs in the USA: 1974 to beyond 2000
N75-12435
Survey of applications of fusion power technology to the chemical and material processing industry
[BNL-18866] N75-12443
Peaceful nuclear explosions and the environment
[JPRS-63502] N75-12719

TECTONICS
Experiment to evaluate feasibility of utilizing Skylab-EREP remote sensing data of tectonic analysis of the Bighorn Mountains region, Wyoming-Montana -- Black Hills, South Dakota/Wyoming
[E75-10014] N75-12395

TELECOMMUNICATION
The TAM-TAM system --- development of air-ground-air data transmission link for air traffic control
[RAE-LIB-TRANS-1756] N75-11913
Communication link with CO2 laser
[FOA-2-C-2584-E2] N75-12176
TDRSS telecommunications study. Phase 1: Final report
[NASA-CR-139157] N75-12177
Systems applications and implementation 1: Communications --- employing surface acoustic wave devices
N75-12700

TELESCOPES
Telescope Systems for Balloon-Borne Research
[NASA-TM-X-62397] N75-12735
Astronomical observations with the University College London balloon borne telescope
N75-12738
A balloon-borne 1 meter telescope for far-infrared astronomy
N75-12740
Design and performance of a 39cm balloon-borne telescope
N75-12742
A cooled telescope for infrared balloon astronomy
N75-12744
A balloon-borne cryogenically cooled filter radiometer
N75-12745
Ultraviolet stellar spectrophotometry from a balloon platform
N75-12746
AIROscope: Ames infrared balloon-borne telescope
N75-12747
Balloon platform for extended-life astronomy research
N75-12748
Low-background air-infrared telescope for balloon-borne infrared astronomy
N75-12749
Stabilization, pointing and command control of a balloon-borne 1-meter telescope
N75-12756

TELEVISION EQUIPMENT
The stellar and solar tracking system of the Geneva Observatory gondola
N75-12753
AIROscope stellar acquisition
N75-12757
The AIROscope pointing and stabilization system
N75-12758

TELEVISION SYSTEMS
UHF television: Requirements for long-term and short-period carrier drive frequency stability
[BBC-RD-1974/33] N75-12167

TEMPERATURE CONTROL
The conception and realisation of sub-assemblies for the temperature control of a microthruster. Optimisation by development of a mathematical model
[RAE-LIB-TRANS-1757] N75-12067
On the interpretation of the output of hot-film anemometers and a scheme of dynamic compensation for water temperature variation
[AD-784912] N75-12295
Thermostatically controlled nontracking type solar energy concentrator
[NASA-CASE-NPO-13497-1] N75-12429

TEMPERATURE EFFECTS
Temperature dependence of the ferromagnetic resonance linewidth of lunar soils, iron and magnetite precipitates in simulated lunar glasses, and nonspherical metallic iron particles
[CONF-740321-2] N75-12106
Thin-walled beam theory generalized to include thermal effects and arbitrary twist angle
[CRC-1253] N75-12363
Thermal ratcheting of a beam
[ANL-CT-74-16] N75-12371

TEMPERATURE MEASUREMENT
Friction and temperature rise in aircraft tires
[NASA-CR-134666] N75-11929
Turbine gas temperature measurement and control system
[NASA-CR-140971] N75-11987
Temperature measurements in wind tunnels
[RAE-LIB-TRANS-1736] N75-11998
Debye-Waller measurements in silicon
[COO-1198-1075] N75-12107
Thermocouple installation
[NASA-CASE-NPO-13540-1] N75-12276

TENNESSEE
Hydrologic significance of lineaments in central Tennessee
[E75-10030] N75-12401
Applicability of Skylab remote sensing for detection and monitoring of surface mining activities --- strip mining and reclamation in Kentucky and Tennessee
[E75-10038] N75-12407

TENSILE PROPERTIES
Properties of thick type 308 stainless steel welds with controlled residual elements
[ORNL-TM-4206] N75-12369

TENSOMETERS
Respiratory activity sensor using conducting paper
N75-12569

TERMINAL BALLISTICS
Feasibility of explosively driven hypervelocity projectiles --- acceleration of multiple gram-sized projectiles to ten kilometers per second
[AD-784271] N75-11907

TERMINAL FACILITIES
The TAM-TAM system --- development of air-ground-air data transmission link for air traffic control
[RAE-LIB-TRANS-1756] N75-11913
An advanced air traffic management concept based on extension of the upgraded third generation ATC system. System B: Airport capacity analysis
[AD-785334] N75-11917
An advanced air traffic management concept based on extensions of the upgraded third generation ATC system. System B: 1995 Los Angeles Basin traffic model, volume 2
[AD-785310] N75-11927
Development of microwave landing system implementation criteria
[AD-785220] N75-12005

TERNARY ALLOYS
Hardness behavior of binary and ternary niobium alloys at 77 and 300 K
[NASA-TN-D-7847] N75-12127

TERRAIN FOLLOWING AIRCRAFT
LYSTER: Air defence surface protection capability in Swedish terrain
[FOA-P-C-8349-M1] N75-12890

TEST EQUIPMENT
High power ac/dc variable R dynamic electrical load simulator
[NASA-CR-140331] N75-12199
Design and fabrication of a versatile testing system for MNOS
[AD-785131] N75-12221
Signal conditioner test set
[NASA-CASE-KSC-10750-1] N75-12270
On the interpretation of the output of hot-film anemometers and a scheme of dynamic compensation for water temperature variation
[AD-784912] N75-12295
Automated testing in a high noise environment
[BDX-613-1133] N75-12348

TEST FACILITIES
Environmental investigation of pilot propulsion test sled
[AD-785134] N75-12010
Chemical and physical testing of thermal insulation materials for use at FFTF and SPTF
[LMEC-74-6] N75-12100

TETHERED BALLOONS
Air Force Cambridge Research Laboratories balloon operations
N75-12752

TETHERLINES
Analysis of unmanned, tethered, rotary-wind platforms
[AD-785581] N75-11903

TETRAZOLES
Procedure for the isolation and determination of aldosterone in human urine by thin-film chromatography on polyamide and BTC micro-reaction
[RAE-LIB-TRANS-1778] N75-12579

TEXAS
Develop techniques and procedures, using multispectral systems, to identify from remotely sensed data the physical and thermal characteristics of plants and soil --- Southern Texas
[E75-10012] N75-12394
Irrigation scheduling, freeze warning and soil salinity detecting --- Cameron County, Texas
[E75-10046] N75-12414

TEXTURES
Time series model for texture synthesis
[TID-26599] N75-12692

THEOREMS
Generalization of domination structures and nondominated solutions in multicriteria decision making
[AD-784418] N75-12845

THERMAL BATTERIES
Multishot thermal battery --- power source for radio equipment
[AD-785584] N75-12450

THERMAL CYCLING TESTS
Effect of exposure cycle on hot salt stress corrosion of a titanium alloy
[NASA-TM-X-3145] N75-12128

THERMAL INSULATION
Chemical and physical testing of thermal insulation materials for use at FFTF and SPTF
[LMEC-74-6] N75-12100
Structural heat pipe --- for spacecraft wall thermal insulation system
[NASA-CASE-GSC-11619-1] N75-12222

THERMAL POLLUTION
Analytical modeling of thermal discharges. A review of the state of the art
[ANL/ES-18] N75-12456
Field investigations of heated discharges from nuclear power plants on Lake Michigan, 1972
[ANL/ES-32] N75-12457

THERMAL PROTECTION
An arc imaging furnace for the characterization of thermally protective materials
[AD-785586] N75-12055

THERMAL SHOCK
Thermal and acoustic fatique of ceramics and their evaluation
[AD-785547] N75-12152

THERMISTORS
Low-pressure measurement by thermistor, and orifice-effect determination in rarefied gas flows
[RAE-LIB-TRANS-1734] N75-12224

THERMOCOUPLES
Thermocouple installation
[NASA-CASE-NPO-13540-1] N75-12276

THERMODYNAMIC PROPERTIES
High-temperature thermodynamic properties of sodium
[ANL-8095] N75-12102
The influence of frost formation and defrosting on the performance of air coolers
[WTHD-63] N75-12238
Analysis of the working process of a free piston expander
N75-12240
Develop techniques and procedures, using multispectral systems, to identify from remotely sensed data the physical and thermal characteristics of plants and soil
[E75-10033] N75-12403

THERMODYNAMICS
Vaporization kinetics and thermodynamics of graphite using the high pressure mass spectrometer
[AD-785136] N75-12113

THERMOELASTICITY
Excitation of plane thermoelastic waves in a layer with a finite rate of heat propagation
[AD-785190] N75-12820

THERMOELECTRIC GENERATORS
MC2730 radioisotopic thermoelectric generator: A development report
[SLA-74-46] N75-12446

THERMOELECTRICITY
Instrument to measure radiant heat fluxes --- principles and construction of absolute two-sided radiometer
N75-12280

THERMONUCLEAR EXPLOSIONS
On the possibilities of a directly igniting fusion charge --- by electron beam or laser irradiation
[FOA-4-C-4530-A1] N75-12095

THERMONUCLEAR POWER GENERATION
DCTR power supply and energy storage review meeting
[WASH-1310] N75-12445
Short description of the thermonuclear facilities of the I. V. Kurchatov Institute for Nuclear Energy
[ANL-TRANS-952] N75-12722
Superconducting magnetic energy storage --- theta pinch thermonuclear fusion test reactor
[LA-UR-74-737] N75-12814

THERMOSPHERE
A three-dimensional numerical model of the upper atmosphere. Volume 2: Steady-state solutions for a single-fluid model with a fixed temperature field
[AD-778420] N75-12481

THERMOSTATS
Thermostatically controlled nontracking type solar energy concentrator
[NASA-CASE-NPO-13497-1] N75-12429

THETA PINCH
Superconducting magnetic energy storage --- theta pinch thermonuclear fusion test reactor
[LA-UR-74-737] N75-12814

THIN FILMS
Method of preparing water purification membranes --- polymerization of allyl amine as thin films in plasma discharge
[NASA-CASE-ARC-10643-1] N75-12087
The deposition of Er-Eu-Ga-F c0e garnet single crystal films
[AD-785511] N75-12111
System for depositing thin films
[NASA-CASE-MFS-20775-1] N75-12161
Transmission models for microwave microelectronics using thin films on ferrimagnetic substrates
[REPT-1230/73-143] N75-12192

Active circuits for integrated optics. Study of a transverse electro-optical effect modulator
[LCR-73-133/R/G.5] N75-12193
Thin film research and development --- antireflectance coatings for acrylic plastics
[AD-779389] N75-12339
Structure dependent properties of thin film superconductors
[AD-785424] N75-12822

THIN LAYER CHROMATOGRAPHY
Procedure for the isolation and determination of aldosterone in human urine by thin-film chromatography on polyamide and BTC micro-reaction
[RAE-LIB-TRANS-1778] N75-12579

THIN WALLED SHELLS
Buckling stress coefficients for thin-walled unstiffened circular cylinders under combined axial compression and internal pressure
[ESDU-04.01.01-AMEND-A] N75-12352
Structural mechanics of skewed thin wall systems
[AD-785116] N75-12376

THIN WALLS
Thin-walled beam theory generalized to include thermal effects and arbitrary twist angle
[CRC-1253] N75-12363

THORIUM COMPOUNDS
Hydrogen solubility in 1:5 compounds between Y or Th and Ni or Co
[COO-3429-19] N75-12076

THREE DIMENSIONAL COMPOSITES
A three dimensional variable node isoparametric solid element --- linear stress analysis
[AD-785353] N75-12377

THREE DIMENSIONAL FLOW
Leeside flow field description over cones at large incidence
[AD-785369] N75-12260

THREE DIMENSIONAL MOTION
Summarized results of tests on Singer-Kearfott's gyroflex gyro
[FOA-2-A-2562-E4] N75-12282

THRUST CHAMBERS
Space shuttle maneuvering engine reusable thrust chamber program. Task 11: Low epsilon stability test report data dump
[NASA-CR-140358] N75-12069

THYRISTORS
Translations on Eastern Europe: Scientific affairs, no. 440 --- including radiowave measurement of solar corona and thyristor dc electric drive
[JPRS-63573] N75-12832
Thyristor dc electric drive with time-proportional speed control
N75-12834

TIMBER VIGOR
Inventory of forest and rangeland resources, including forest stress --- Colorado, Georgia, and Black Hills, South Dakota
[E75-10032] N75-12402

TIME OPTIMAL CONTROL
Time-optimal control synthesis for non-linear systems: A flight dynamic example
[AD-785405] N75-12671

TIME SERIES ANALYSIS
Study of multiple time series by data analysis
[CEA-R-4561] N75-12679
Time series model for texture synthesis
[TID-26599] N75-12692

TITANIUM
Study on development of high Mn austenitic heat resisting steel: Choice of base composition and the effect of small additions of Ti and Nb
[NASA-TT-F-16043] N75-12117

TITANIUM ALLOYS
Heat resistant titanium alloys. Introduction of the alloy UT 651A
[RAE-LIB-TRANS-1790] N75-12123
The alpha-beta titanium alloys. A comparison of the heat treatment and properties of the alloys: Ti-6Al-4V, Ti-6Al-6V-2Sn and Ti-6Al-6V-2Sn-6Zr
[RAE-LIB-TRANS-1797] N75-12125
Effect of exposure cycle on hot salt stress corrosion of a titanium alloy
[NASA-TM-X-3145] N75-12128
Study of phase transformations in titanium alloy. 3: Study of isothermal transformations of Beta 3 titanium alloy
[CEA-R-4567] N75-12130
Phase transformations in titanium alloys. 1. Contribution to study of transformation kinetics in Ti-6 percent Al-6 percent V-2 percent Sn alloy
[CEA-R-4542] N75-12131
Acoustic emissions and stress-corrosion cracking in high-strength alloys
[AD-785009] N75-12136
Effects of microstructural modification on titanium toughness and fatigue
[AD-785409] N75-12139
The characterization of the reversion stress for NiTi
[AD-784761] N75-12373

TITANIUM CARBIDES
Preparation of substoichiometer titanium carbides and mixed titanium-tantalum carbides --- using powder metallurgy and sintering techniques
[CEA-N-1684] N75-12079

TITANIUM COMPOUNDS
Iron titanium hydride as a source of hydrogen fuel for stationary and automotive applications
[BNL-18651] N75-12441

TOLERANCES (PHYSIOLOGY)
The tolerance of birds to airblast
[AD-785259] N75-12550

TOOLING
Influence of tool feed [IN/REV] on the machinability of CO2 laser optics
[Y-DA-5786] N75-12305

TORNADOES
The nonlinear growth of hurricanes through CISK
[AD-782662/1] N75-12535

TOROIDS
The radial free flight arc
N75-12788

TORQUE
The torques occurring in the starting of polyphase induction-motors with squirrel-cage rotors
[RAE-LIB-TRANS-1782] N75-12211
Study of the turbulent torque flow in a cylindrical model apparatus
N75-12232

TORSIONAL VIBRATION
Calculation of the flapwise bending, edgewise bending, and torsional vibrations of rotor blades with coupled natural modes and frequencies
[NASA-TT-F-16004] N75-11892

TOUGHNESS
Fracture toughness characterization of shipbuilding steels
[AD-785034] N75-12141

TOWED BODIES
Electric tow truck for planes described
N75-12835

TOWERS
On-line data acquisition and data processing in a meteorological tower-PDP-8/1-CALAS system coupling
[KFK-1934] N75-12532

TRACE ELEMENTS
Nulling device for detection of trace gases by NDIR absorption
[NASA-CASE-ARC-10760-1] N75-12275
Investigation of the dynamics of accumulation of trace elements by chlorella cells during prolonged cultivation
N75-12560

TRADEOFFS
Acoustic attenuation design requirements established through EPNL parametric trades
[NASA-CR-120986] N75-11985

TRAILING EDGES
A wind tunnel investigation of the wake near the trailing edge of a deflected externally blown flap --- on a jet powered STOL transport aircraft
[NASA-TM-X-3079] N75-11896

TRAINING SIMULATORS
Psychophysiological stress investigations of an instrument-coordination analyzer
N75-12607

TRAJECTORY ANALYSIS
FORTRAN program for calculating the trajectory of projectiles
[FOA-2-A-2564-D8] N75-11894

TRAJECTORY OPTIMIZATION
User's guide to four-body and three-body trajectory optimization programs
[NASA-CR-139156] N75-12020

TRANSFER FUNCTIONS
King's law coefficients computation method for linearization of the constant temperature anemometer
[AAAF-NT-74-2] N75-12274

TRANSFORMATIONS (MATHEMATICS)
Bell transform --- important to certain Monte Carlo method
[LA-UR-74-831] N75-12686

TRANSFORMERS
Control of a transistor switch by current transformer
[RAE-LIB-TRANS-1774] N75-12196
Inhomogeneous oil spark paths at unipolar voltage load
N75-12197

TRANSISTORS
Control of a transistor switch by current transformer
[RAE-LIB-TRANS-1774] N75-12196

TRANSITION METALS
Studies on N2 fixation in transition metal complexes of chromium, molybdenum, and tungsten
N75-12118
Type 2 film superconductors for power applications
[AD-785534] N75-12220

TRANSITION PROBABILITIES
Transition probabilities, correlation functions and dielectric permittivity tensors for semibounded and bounded nonequilibrium plasma
[ITF-74-21E] N75-12800

TRANSMISSION
On the scanning electron microscopy of thin specimens in transmission
N75-12291

TRANSMITTANCE
A method for measuring small transmittances and reflectances with the Cary 14R spectrophotometer-spectroradiometer
[DSL-TN-334] N75-12764

TRANSMITTERS
Monolithic laser --- gallium indium arsenide optical transmitter
[AD-785021] N75-12325
Operation of Polish equipment used on Interkosmos space satellite described --- specifically - radiospectrograph onboard Intercosmos-Kopernik 500 satellite
N75-12833

TRANSONIC FLOW
Second and third order difference techniques for two-dimensional hyperbolic systems of conservation laws, with an application to transonic flow about an airfoil
[UCRL-51529] N75-12251
On the flow near a weak shock wave downstream of a nozzle throat --- numerical analysis of pressure gradient, streamline curvature, and shock wave curvature
[AD-785283] N75-12257

TRANSONIC SPEED
Transonic and supersonic wind tunnel test of the action hypervelocity test missile. Volume 1: Stability characteristics
[AD-785565] N75-11904
Transonic and supersonic wind tunnel test of the action hypervelocity test missile. Volume 2: Drag characteristics
[AD-785566] N75-11905

TRANSONIC WIND TUNNELS
Simulation of flight test conditions in the Langley pilot transonic cryogenic tunnel
[NASA-TN-D-7811] N75-12001
Application of linearized transonic theory to tunnel blockage interference --- calculated with equations of motion
[AD-785349] N75-12008

TRANSPONDERS
TDRSS telecommunications study. Phase 1: Final report
[NASA-CR-139157] N75-12177

TRANSPORT AIRCRAFT
A wind tunnel investigation of the wake near the trailing edge of a deflected externally blown flap --- on a jet powered STOL transport aircraft
[NASA-TM-X-3079] N75-11896
Aerodynamic roll damping of a T-tail transport configuration
[NASA-TM-X-3115] N75-11898
Design and mockup evaluation of a high-strength armored crew seat for transport/cargo aircraft
[AD-785145] N75-11956
An emergency life saving instant exit system for cargo, cargo-transport and passenger aircraft, volume 2
[AD-778824] N75-11966

TRANSPORT PROPERTIES
Transport optical and magnetic properties of solids
[AD-785429] N75-12710

TRANSPORTATION
Field testing of a system for communication with commercial SNM shipments
[SLA-74-5431] N75-12181
Radioactive shipments through our states: The weakest link? --- conference
[CONF-730588] N75-12860

TRANSVERSE WAVES
A shear flow instability due to the finite ion gyroradius
[MPI-PAE/EXTRATERR-96] N75-12774

TREES (MATHEMATICS)
Dual trees and resummation theorems
[COO-2271-28] N75-12693

TREES (PLANTS)
Energy plantations: Should we grow trees for power plant fuel?
[VP-X-129] N75-12436
Reconstruction of past climatic variability
[AD-785395] N75-12536

TRIANGULATION
Leveling of elevations in blocks compiled from flight-line nets in phototriangulation
[AD-783830] N75-12426

TRITIUM
Tritium economy and tritium safety of fusion power plants
[IPP-4/112] N75-12728
Burn characteristics of marginal deuterium-tritium microspheres
[LA-5603-MS] N75-12729

TROPICAL REGIONS
Some characteristics of the vertical structure of tropospheric currents in the tropical regions of the east Atlantic
N75-12500
Structure and migration of the equatorial zone of west winds in the Eastern Hemisphere
N75-12513

TROPOSPHERE
Some characteristics of the vertical structure of tropospheric currents in the tropical regions of the east Atlantic
N75-12500
Structure and migration of the equatorial zone of west winds in the Eastern Hemisphere
N75-12513

TRUCKS
Translations on Eastern Europe: Scientific affairs, no. 440 --- including radiowave measurement of solar corona and thyristor dc electric drive
[JPRS-63573] N75-12832
Electric tow truck for planes described
N75-12835

TRUSSES
The use of geometric programming methods for structural optimization
N75-12360

TUBES
The effect of material damping on the dynamics of a vertical tubular cantilever conveying fluid
[MERL-TN-74-1] N75-12355

TUNERS
Frequency tuned CO2 laser
[AD-785180] N75-12317

TURBINE BLADES
Liquid metal cooling of turbine blades
[RAE-LIB-TRANS-1713] N75-11977

TURBOFAN ENGINES
Engines for commercial STOL transports --- high bypass turbofan
N75-11947
Propulsion concepts for STOL aircraft --- high bypass turbofan engines and air supply system for wings with internally blown flaps
N75-11948
Effect of treated length on performance of full scale turbofan inlet noise suppressors
[NASA-TN-D-7826] N75-11978
Small turbine engine noise reduction. Volume 5: Data tabulations
[AD-780576/5] N75-11988
Effect of blade row geometry on axial flow rotor unsteady response to inflow distortions
[AD-785276] N75-11991
Multiple fault gas path analysis applied to TF30-P-408 engine data
[AD-785265] N75-11996

TURBOFANS
Impact resistance of hybrid composite fan blade materials
[NASA-CR-134712] N75-12077

TURBOJET ENGINES
Effect of swirling flow on augmentor performance --- turbojet engines application
[NASA-CR-134639] N75-11972

TURBOPROP ENGINES
Small turbine engine noise reduction. Volume 5: Data tabulations
[AD-780576/5] N75-11988
Combustion generated noise in turbopropulsion systems
[AD-785485] N75-11990

TURBULENT BOUNDARY LAYER
Numerical study of separated turbulent flows
N75-12226
Nonuniform grid method for turbulent boundary layers
[SAND-74-5023] N75-12253
Analytical study of subsonic turbulent boundary layer separation including viscous-inviscid interaction
[NASA-CR-140958] N75-12254
The connection between intermittent turbulent activity near the wall of a turbulent boundary layer with pressure fluctuations at the wall
[AD-785271] N75-12258
Leeside flow field description over cones at large incidence
[AD-785369] N75-12260

TURBULENT DIFFUSION
Turbulent diffusion in the environment
N75-12506

TURBULENT FLOW
Effect of swirling flow on augmentor performance --- turbojet engines application
[NASA-CR-134639] N75-11972
Cascade tests of serrated leading edge blading at high subsonic speeds
[NASA-CR-2472] N75-11983
A unified statistical model of the premixed turbulent flame
[AASU-335] N75-12094
Investigation of viscous line vortices with and without the injection of core turbulence
[AD-785256] N75-12261
Application of a dual beam laser velocimeter to turbulent flow measurements
[AD-785352] N75-12324

TURBULENT HEAT TRANSFER
Turbulent heat transfer prediction method for application to scramjet engines
[NASA-TN-D-7810] N75-12234

TWO DIMENSIONAL FLOW
A numerical method for the solution of particulate flow equations --- within two dimensional flow
[REPT-74-42] N75-12227
Second and third order difference techniques for two-dimensional hyperbolic systems of conservation laws, with an application to transonic flow about an airfoil
[UCRL-51529] N75-12251
Similarity solutions of the boundary layer equations for flow over a moving wall
[AD-781496/5] N75-12259
Additional two-dimensional wake and jet-like flows
[AD-785522] N75-12262
Two-dimensional calculations of high density laser induced fusion: Study of symmetry and Taylor instability
[UCRL-74926] N75-12302

TWO PHASE FLOW
Experimental determination of countercurrent two-phase flow of water --- light water breeder reactors
[ORO-4348-1] N75-12731

TYPHOONS
The nonlinear growth of hurricanes through CISK
[AD-782662/1] N75-12535

U

U.S.S.R.
Soviet bloc research in geophysics, astronomy, and space, no. 336
[JPRS-63427] N75-12385
Geotechnological methods for mineral production --- in the U.S.S.R.
[JPRS-63469] N75-12386
In the interests of clean air --- in Kiev, Ukraine
[AD-785206] N75-12460
Seismic events in the USSR in 1972
[FOA-C-20018-T1] N75-12470
Fiftieth anniversary of the Belorussian Hydrometeorological Service
N75-12489
Procedure for five-day forecasting of significant and weak precipitation in the territory of Northern Kazakhstan in May - July
N75-12496
Analysis of two cases of significant precipitation observed in the foothills of northern Tyan'-Shan'
N75-12501
Weather forecast and forecast of the agrometeorological conditions for the Fall of 1974 [26 August to 15 October]
N75-12527

U.S.S.R. SPACE PROGRAM
Visiting the solar family --- U.S.S.R. and United States of America unmanned spacecraft and planetary probes
[NASA-TT-F-14795] N75-12013

UH-1 HELICOPTER
Engineering flight test, AH-1G helicopter, heavyweight autorotational evaluation
[AD-785553] N75-11964
Development of an improved design tool for predicting and simulating helicopter rotor noise
[AD-785579] N75-11993

ULTRAHIGH FREQUENCIES
UHF television: Requirements for long-term and short-period carrier drive frequency stability
[BBC-RD-1974/33] N75-12167

ULTRASONIC TESTS
Data acquisition and processing system for ultrasonic research
[AD-785127] N75-12852

ULTRASONIC WAVE TRANSDUCERS
Ultrasonic bone densitometer
[NASA-CASE-MFS-20994-1] N75-12271

ULTRAVIOLET RADIATION
Long range materials research --- generation of coherent vacuum ultraviolet radiation and soft X-rays
[AD-784962] N75-12140
Mechanical properties of Skylab thermal shield materials after prolonged ultraviolet irradiation
[NASA-TN-D-7844] N75-12144
Analysis of VUV and X-ray lasers pumped by a traveling-wave source
[AD-784995] N75-12318
Molecular basis for the mutagenic and lethal effects of ultraviolet irradiation
[COO-3232-3] N75-12548

ULTRAVIOLET SPECTROMETERS
Balloon-borne ultraviolet stellar spectrometer: Acquisition, tracking and command systems
N75-12755

ULTRAVIOLET SPECTROPHOTOMETERS
Ultraviolet stellar spectrophotometry from a balloon platform
N75-12746

UNDERGROUND EXPLOSIONS
Seismic magnitudes from explosions and earthquakes obtained at the Hagfors and Matsushiro Observatories
[FOA-C-20010-T1] N75-12465

UNDERWATER ACOUSTICS
Directivity of hydroacoustic antennas
[JPRS-63554] N75-12204

UNDERWATER ENGINEERING
The cavitation laboratory of the Swedish state shipbuilding experimental tank
[CIRC-32] N75-12250
Advanced marine technology
[AD-784420] N75-12543

UNDERWATER STRUCTURES
Development of an improved technique for forming acrylic spheres --- application to underwater habitation and exploration
[AD-784113] N75-12337

UNITED STATES OF AMERICA
The value of improved [ERS] information based on domestic distribution effects of U.S. agriculture crops
[NASA-CR-141046] N75-12423
Energy and security: Implications for American policy
[AD-785084] N75-12857

UPPER ATMOSPHERE
Measurements of the basic atmospheric parameters at Woomera using the falling sphere, August to November 1973
[WRE-TN-1246(WR-D)] N75-12466
A three-dimensional numerical model of the upper atmosphere. Volume 2: Steady-state solutions for a single-fluid model with a fixed temperature field
[AD-778420] N75-12481

URBAN PLANNING
Nord data 72 at Helsinki, June 1972
[FOA-1-C-1496-M4] N75-12849

URINALYSIS
Procedure for the isolation and determination of aldosterone in human urine by thin-film chromatography on polyamide and BTC micro-reaction
[RAE-LIB-TRANS-1778] N75-12579

USER MANUALS [COMPUTER PROGRAMS]
Community noise exposure resulting from aircraft operations: Computer program operation's manual
[AD-785360] N75-11989
The Mark 4 supersonic-hypersonic arbitrary body program. Volume 1: User's manual
[AD-778443] N75-12056
Supporting program and program system for the assembly program in Tiros
[FOA-1-C-1470-C4] N75-12633
Introduction to the structure of dialogue directed computer programs
[FOA-P-C-8361-M3] N75-12638
User's guide for program ISOPLT to plot isotherms
[SLA-74-242] N75-12647

UTAH
Experimental evaluation of atmospheric effects on radiometric measurements using the EREP of Skylab --- Bonneville Salt Flats, Utah
[E75-10036] N75-12406
Geologic and mineral and water resources investigations in Western Colorado, using Skylab EREP data --- Utah
[E75-10043] N75-12412

V

VACUUM CHAMBERS
Soldering large area joints in vacuum
[SLA-73-1075] N75-12335
Chamber for decompressing the caudal part of the animal body
N75-12568

VALLEYS
Boundary layer aerosol transport measurements in a valley system
[AD-781010/4] N75-12477

VANES
Subcritical and supercritical compressible flows without shock in vane meshes
[AAAF-NT-74-1] N75-12225

VAPOR DEPOSITION
System for depositing thin films
[NASA-CASE-MFS-20775-1] N75-12161

VAPOR PHASES
Airborne vapor surveillance system
[AD-785585] N75-12459

VECTORCARDIOGRAPHY
ECG changes in the MX, DS and MC leads in cases of focal and diffuse damage to the cardiac muscle
N75-12570

VECTORS [MATHEMATICS]
Obtaining initial vectors for minimizing the probability of misclassification
[NASA-CR-140348] N75-12675

VEGETATION
Study of recreational land and open space using Skylab imagery --- southeast Michigan
[E75-10034] N75-12404
Detection of moisture and moisture related phenomena from Skylab --- Kansas, Oklahoma, and Arkansas
[E75-10035] N75-12405

VELOCITY MEASUREMENT
Tests on axial velocity sensor --- electrodynamic principle N75-12049
Cluster intensity and velocity measurements in condensed flows
[AD-785348] N75-12264
Application of a dual beam laser velocimeter to turbulent flow measurements
[AD-785352] N75-12324
VENUS ATMOSPHERE
Radiative property data for Venusian entry: A compendium
[NASA-SP-348] N75-12880
VERTICAL DISTRIBUTION
Aerostatic measurements of the vertical distribution of the atmospheric aerosol
[AD-785114] N75-12479
VERTICAL PERCEPTION
Model of human dynamic orientation --- associated with vestibular stimuli
[NASA-CR-132537] N75-12585
VERTICAL TAKEOFF AIRCRAFT
Vertical and short take-off demonstrated by the VAK 191 B N75-11939
VESTIBULAR TESTS
Neurophysiological aspects of interaction of the vestibular system with other body sensory systems N75-12553
Some problems in evaluating the vestibular function of aviators and cosmonauts N75-12561
Function of perception of space coordinates during vestibular trained by active, passive and complex methods N75-12563
Model of human dynamic orientation --- associated with vestibular stimuli
[NASA-CR-132537] N75-12585
VIBRATION
Vibration disease and its pathogenesis
[AD-785202] N75-12584
VIBRATION DAMPING
Foucault current damping tests N75-12047
VIBRATION EFFECTS
Vibration energy density spectra in response domain for viscous damped elastic systems with sinusoidal and broadband random excitation
[AD-784974] N75-12383
VIBRATION ISOLATORS
Calculations on an elementary fluid damper --- magnetic bearing supports N75-12046
VIBRATION TESTS
Viking Mars lander 1975 dynamic test model/orbiter developmental test model forced vibration test
[NASA-CR-140851] N75-12028
Fatigue crack propagation due to random amplitude vibrations: Prediction using constant amplitude data
[RD/B/N-2784] N75-12368
VIBRATIONAL SPECTRA
Vibration energy density spectra in response domain for viscous damped elastic systems with sinusoidal and broadband random excitation
[AD-784974] N75-12383
VIKING LANDER SPACECRAFT
Viking Mars lander 1975 dynamic test model/orbiter developmental test model forced vibration test
[NASA-CR-140851] N75-12028
VIKING MARS PROGRAM
Visiting the solar family --- U.S.S.R. and United States of America unmanned spacecraft and planetary probes
[NASA-TT-F-14795] N75-12013
VIKING ORBITER SPACECRAFT
Viking Mars lander 1975 dynamic test model/orbiter developmental test model forced vibration test
[NASA-CR-140851] N75-12028
VISCOELASTICITY
A relaxometer for polymer material
[FOA-4-C-4533-G2] N75-12287
The effect of material damping on the dynamics of a vertical tubular cantilever conveying fluid
[MERL-TN-74-1] N75-12355
VISCOSITY
The viscosity of indium [3] halides N75-12072
VISCOUS DAMPING
Calculations on an elementary fluid damper --- magnetic bearing supports N75-12046
Vibration energy density spectra in response domain for viscous damped elastic systems with sinusoidal and broadband random excitation
[AD-784974] N75-12383
VISCOUS FLOW
Application of wave mechanics theory to fluid dynamics problems: Boundary layer on a circular cylinder including turbulence
[NASA-CR-140849] N75-12230
Analytical study of subsonic turbulent boundary layer separation including viscous-inviscid interaction
[NASA-CR-140958] N75-12254
Investigation of viscous line vortices with and without the injection of core turbulence
[AD-785256] N75-12261
VISIBILITY
Visible magnitude of typical satellites in synchronous orbits
[AD-785380] N75-12024
VISUAL CONTROL
Effects of various runway lighting parameters upon the relation between runway visual range and visual range of centerline and edge lights in fog
[NASA-TM-X-72112] N75-12604
VISUAL DISCRIMINATION
Detectability of an unsharp edge in additive noisy background
[FOA-2-C-2591-E1-H5] N75-12577
VISUAL PERCEPTION
A motion-constraint logic for moving-base simulators based on variable filter parameters
[NASA-TN-D-7777] N75-11933
Visual information processing of complex imagery
[AD-785366] N75-12612
Application of response surface methodology to shape discrimination
[AD-785367] N75-12614
VISUAL STIMULI
Variability in reaction response --- human response accuracy as function of training and fatigue
[FOA-2-C-2581-H5] N75-12586
VLASOV EQUATIONS
Numerical and analytical investigation of nonlinear properties of the Vlasov equation
[COO-2059-37] N75-12801
VOICE COMMUNICATION
Adaptive differential PCM speech transmission
[AD-785124] N75-12191
VOLTAGE REGULATORS
Experiments on conventional excess voltage transient protection as a protection against an EMP transient
[FOA-4-C-4526-A3] N75-12207
VOLUMETRIC ANALYSIS
A feasibility study of limb volume measuring systems
[NASA-CR-140330] N75-12580
VORTICES
Investigation of viscous line vortices with and without the injection of core turbulence
[AD-785256] N75-12261
Disturbances in a wall boundary layer introduced by an array of low-intensity vortices
[AD-785394] N75-12268

W

WAKES
Additional two-dimensional wake and jet-like flows
[AD-785522] N75-12262
WALL PRESSURE
The connection between intermittent turbulent activity near the wall of a turbulent boundary layer with pressure fluctuations at the wall
[AD-785271] N75-12258
WALL TEMPERATURE
Structural heat pipe --- for spacecraft wall thermal insulation system
[NASA-CASE-GSC-11619-1] N75-12222
WALLS
Disturbances in a wall boundary layer introduced by an array of low-intensity vortices
[AD-785394] N75-12268
WARHEADS
Fabrication and performance assessment of shaped charges --- damage capacity of the warmead
[DSL-546] N75-12155
WARNING SYSTEMS
Development of a battery status monitor
[NASA-CR-140362] N75-12278
Remote sensing utility in a disaster struck urban environment
[NASA-CR-140801] N75-12858
WATER
Clustering of water on hydrated protons in a supersonic free jet expansion
[AD-785284] N75-12263
WATER CIRCULATION
Mathematical models for some problems in water conservation
[PT-1972:7] N75-12387
The influence of surface waves on water circulation in a mid-Atlantic continental shelf region
[NASA-TN-D-7771] N75-12537
WATER COOLED REACTORS
Compilation of occupational radiation exposure from light water cooled nuclear power plants, 1969 - 1973
[WASH-1311] N75-12724
WATER MANAGEMENT
Mathematical models for some problems in water conservation
[PT-1972:7] N75-12387
Project Skywater --- precipitation management for water reclamation
[REC-ERC-73-17] N75-12487
WATER POLLUTION
Analytical modeling of thermal discharges. A review of the state of the art
[ANL/ES-18] N75-12456
Turbulent diffusion in the environment N75-12506
WATER RECLAMATION
Project Skywater --- precipitation management for water reclamation
[REC-ERC-73-17] N75-12487
WATER RESOURCES
Geologic and mineral and water resources investigations in Western Colorado, using Skylab EREP data --- Utah
[E75-10043] N75-12412
WATER TREATMENT
Method of preparing water purification membranes --- polymerization of allyl amine as thin films in plasma discharge
[NASA-CASE-ARC-10643-1] N75-12087
WATER VAPOR
Infrared radiation from H2O, CO2 or NH3 collisionally excited by N2, O or Ar
[AD-785412] N75-12827
WATER WAVES
A simulation of synthetic aperture radar imaging of ocean waves
[NASA-TM-X-72629] N75-12172
The influence of surface waves on water circulation in a mid-Atlantic continental shelf region
[NASA-TN-D-7771] N75-12537
Marine physics: Internal-surface wave interaction
[AD-785262] N75-12540
WATERSHEDS
A Skylab program for the International Hydrological Decade [IHD] --- Lake Ontario Basin
[E75-10039] N75-12408
WAVE EXCITATION
Excitation of plane thermoelastic waves in a layer with a finite rate of heat propagation
[AD-785190] N75-12820
WAVE FUNCTIONS
Application of wave mechanics theory to fluid dynamics problems: Fundamentals
[NASA-CR-140847] N75-12228
WAVE INTERACTION
On the interaction of hydromagnetic waves with earth's magnetosphere in a quasi-hydrodynamics approximation N75-12776
WAVE PROPAGATION
Refractive index measurements by adaptive techniques [RIMDAPT: Phases 1 and 1A] --- ray tracing
[AD-785080] N75-12188
Application of wave mechanics theory to fluid dynamics problems: Fundamentals
[NASA-CR-14084] N75-12228
Lamp code users guide --- numerical analysis of laser outputs in either active or passive host media
[UCID-16525] N75-12310
Solar-geophysical effects on northern and mid-latitude ELF propagation
[AD-785011] N75-12711
Transverse propagation constants in dielectric waveguides
[AD-785512] N75-12712
Moment characterization of a doubly-spread surface scatter channel at high and low Rayleigh parameters
[AD-785286] N75-12713
Hydromagnetic wave propagation in a three-dimensional Magnetosphere, 2 N75-12777
Propagation of electron waves in a non-Maxwellian plasma
[ISAS-517-VOL-39-14] N75-12778
WAVEFORMS
Comparison of the theoretical errors in the simultaneous measurement of round trip delay and Doppler frequency for several radar waveforms
[SLA-74-30] N75-12179
WAVEGUIDES
Frequency tuned CO2 laser
[AD-785180] N75-12317
Transverse propagation constants in dielectric waveguides
[AD-785512] N75-12712
Power requirements for magneto-optic modulation devices, a theoretical study
[AD-784977] N75-12772
WAVELENGTHS
A wavelength sorting method for electron probe X-ray microanalysis
[DSL-600] N75-12097
WEATHER FORECASTING
Meteorology and hydrology, no. 8, 1974 --- climatology, agriculture meteorology, weather forecasting, and hydrology
[JPRS-63560] N75-12488
Procedure for five-day forecasting of significant and weak precipitation in the territory of Northern Kazakhstan in May - July N75-12496

Future climate --- effects of modern economic activity
N75-12508
Weather forecast and forecast of the agrometeorological conditions for the Fall of 1974 [26 August to 15 October]
N75-12527

WEIGHT [MASS]
Reverification of the NAE 100,000-lb deadweight standard force machine
[NRC-14354] N75-12002
Apparatus for the automatic recorded weighing of fragments
[FOA-2-A-2568-D4] N75-12286

WEIGHT ANALYSIS
Some approximation concepts for structural synthesis
[NASA-CR-140937] N75-12359

WEIGHT INDICATORS
Calibration of a 1 to 10kg set of masses --- designing a calibration scheme
[TN-352] N75-12706

WEIGHTLESSNESS
Investigation of solidification in zero-gravity environment: M553 sphere forming experiment. Nickel-silver alloy evaluation
[NASA-CR-129034] N75-12017
Some regularities in adaptation to prolonged rotation --- improved human tolerance to weightlessness
N75-12562

WEIGHTLESSNESS SIMULATION
Regional hemodynamics in antiorthostatic tests of different intensity
N75-12564
Chamber for decompressing the caudal part of the animal body
N75-12568

WHEAT
Empirical model of the root system of winter wheat considering weather conditions and the soil moisture distribution by layers
N75-12499

WHITEOUT
An examination of whiteouts and transmission through ice fog in the visible and near infrared
[DREO-TN-74-18] N75-12467

WIND [METEOROLOGY]
Relation of the wind and baric fields in the stratosphere and the lower mesosphere of the tropical zone of the Northern Hemisphere
N75-12493
Some characteristics of the vertical structure of tropospheric currents in the tropical regions of the east Atlantic
N75-12500
Structure and migration of the equatorial zone of west winds in the Eastern Hemisphere
N75-12513
Fog and wind regimes of the Eureka-Arcata coastal region of northern California
[AD-785531] N75-12534
The nonlinear growth of hurricanes through CISK
[AD-782662/1] N75-12535

WIND TUNNEL APPARATUS
Low-pressure measurement by thermistor, and orifice-effect determination in rarefied gas flows
[RAE-LIB-TRANS-1734] N75-12224

WIND TUNNEL CALIBRATION
Temperature measurements in wind tunnels
[RAE-LIB-TRANS-1736] N75-11998

WIND TUNNEL MODELS
Subsonic wind tunnel investigation of a twin-engine attack airplane model having nonmetric powered nacelles
[NASA-TN-D-7742] N75-11932

WIND TUNNEL STABILITY TESTS
Transonic and supersonic wind tunnel test of the action hypervelocity test missile. Volume 1: Stability characteristics
[AD-785565] N75-11904

WIND TUNNEL TESTS
Effects of leading edge sweep angle and design lift coefficient on performance of a modified arrow wing at a design Mach number of 2.6
[NASA-TN-D-7753] N75-11893
A wind tunnel investigation of the wake near the trailing edge of a deflected externally blown flap --- on a jet powered STOL transport aircraft
[NASA-TM-X-3079] N75-11896
Transonic and supersonic wind tunnel test of the action hypervelocity test missile. Volume 2: Drag characteristics
[AD-785566] N75-11905
A wind-tunnel investigation of parameters affecting helicopter directional control at low speeds in ground effect
[NASA-TN-D-7694] N75-11931
Subsonic wind tunnel investigation of a twin-engine attack airplane model having nonmetric powered nacelles
[NASA-TN-D-7742] N75-11932
Continuous-output terminal-shock-position sensor for mixed-compression inlets evaluated in wind tunnel tests of YF-12 aircraft inlet
[NASA-TM-X-3144] N75-11971
The cryogenic wind tunnel concept for high Reynolds number testing
[NASA-TN-D-7762] N75-12000
Reentry aerodynamic characteristics of a space shuttle solid rocket booster model 449 tested in MSFC 14 by 14 inch TWT [SA26F]
[NASA-CR-134435] N75-12022
Aerodynamic results of wind tunnel separation tests on a 0.01-scale model [32-OTS] space shuttle integrated vehicle in the AEDC-VKF-SWTA [IA57]
[NASA-CR-134401] N75-12029
Space shuttle launch vehicle [13 P-OTS] strut support interference effects study in the Rockwell International 7- by 7-foot trisonic wind tunnel [IA68]
[NASA-CR-134427] N75-12030
Results of investigations on an 0.015-scale 140A/B configuration of the Rockwell International space shuttle orbiter [model 49-O] in the NASA/Ames Research Center 3.5-foot hypersonic wind tunnel [OA36]
[NASA-CR-134430] N75-12031
Effects of wing/elevon gap sealing flapper doors on orbiter elevon effectiveness of model 16-0 in the NAAL 7.75 by 11 foot continuous flow wind tunnel [OA119A]
[NASA-CR-134421] N75-12035

WIND VELOCITY MEASUREMENT
Application of a single laser Doppler system to the measurement of atmospheric winds
[NASA-TM-X-64891] N75-12462

WINDOWS [APERTURES]
High energy laser windows
[AD-784991] N75-12319

WING CAMBER
Theoretical prediction of thick wing and pylon-fuselage-fanpod-nacelle aerodynamic characteristics at subcritical speeds. Part 1: Theory and results
[NASA-CR-137578] N75-11935
Theoretical prediction of thick wing and pylon-fuselage-fanpod-nacelle aerodynamic characteristics at subcritical speeds. Part 2: Computer program description
[NASA-CR-137579] N75-11936

WING LOADING
Effects of air breathing engine p'umes on SSV orbiter subsonic wing pressure distribution [OA57B], volume 1
[NASA-CR-134416] N75-12034

WING PANELS
Effects of the air breathing engine plumes on SSV orbiter subsonic wing pressure distributions [OA57A]
[NASA-CR-134414] N75-12040

WING PLANFORMS
Application of the nonlinear theory of a listing surface to the calculation of aerodynamic characteristics of a triangular wing moving close to the earth's surface
[AD-785154] N75-11901
Nonlinear theory of a carrying surface in a non-compressible flow
[AD-785113] N75-12266

WING-FUSELAGE STORES
Program for establishing long-time flight service performance of composite materials in the center wing structure of C-130 aircraft. Phase 3: Fabrication
[NASA-CR-132495] N75-11937

WINGS
Numerical methods for the design and analysis of wings at supersonic speeds
[NASA-TN-D-7713] N75-11930

WINTER
Empirical model of the root system of winter wheat considering weather conditions and the soil moisture distribution by layers
N75-12499

WORK CAPACITY
Simulation and study of high workload operations --- psychophysiological effects on air crews
[AGARD-CP-146] N75-12587
Systems simulation: A global approach to aircrew workload --- computerized systems analysis
N75-12588
A simulator study to investigate human operator workload
N75-12589
Laboratory research into human information processing --- pilot workload modeling
N75-12590
Evaluating measures of workload using a flight simulator
N75-12591
A flight simulator study of missile control performance as a function of concurrent workload --- task complexity effects
N75-12592
Simulation of high workload operations in air to air combat
N75-12593
Pilot landing performance under high workload conditions --- considering day and night proficiencies
N75-12594
Aircrew workload and human performance: The problem facing the operational commander --- human component in air weapons system
N75-12595
Endocrine-metabolic indices of aircrew workload: An analysis across studies
N75-12596
Emotional and biochemical effects of high workload --- in pilot landing performance
N75-12598
Long range air-to-air refuelling: A study of duty and sleep patterns
N75-12600
High workload tasks of aircrew in the tactical strike, attack and reconnaissance roles
N75-12601

WORK-REST CYCLE
Measurement and estimation procedure for flight safety control operator workload
N75-12609

X

X RAY ANALYSIS
A wavelength sorting method for electron probe X-ray microanalysis
[DSL-600] N75-12097

X RAY DIFFRACTION
X-ray topographic study of crystal defects produced by diffusion of additive elements in single germanium crystals
N75-12089

X RAY LASERS
Analysis of VUV and X-ray lasers pumped by a traveling-wave source
[AD-784995] N75-12318

X RAY SOURCES
A new measurement of the Her X-1 X-ray pulse profile
[NASA-TM-X-70578] N75-12863

X RAY SPECTROSCOPY
X-ray spectrographic determination of iridium in LiH or LiD
[LA-5564] N75-12104
A high sensitivity balloon-borne X-ray telescope system
N75-12754

X RAY TELESCOPES
A high sensitivity balloon-borne X-ray telescope system
N75-12754

X RAYS
Long range materials research --- generation of coherent vacuum ultraviolet radiation and soft X-rays
[AD-784962] N75-12140
Calculation of the absorption of X-ray radiation in the earth's atmosphere --- bremsstrahlung in stratosphere
[AD-785110] N75-12478
A high intensity flash X-ray tube
[FOA-2-C-2580-E8] N75-12716

XYLENE
Development for application of parylene coatings --- to hybrid microcircuits devices
[NASA-CR-120536] N75-12208

Y

YF-12 AIRCRAFT
Continuous-output terminal-shock-position sensor for mixed-compression inlets evaluated in wind tunnel tests of YF-12 aircraft inlet
[NASA-TM-X-3144] N75-11971

YTTRIUM COMPOUNDS
Hydrogen solubility in 1:5 compounds between Y or Th and Ni or Co
[COO-3429-19] N75-12076

Z

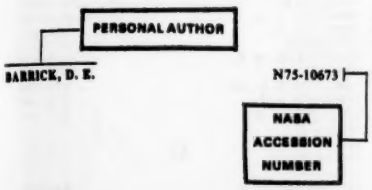
ZINC ALLOYS
Observations on the stress corrosion cracking of an Al-5 percent Zn-2.5 percent Mg ternary and various quarternary alloys
[AD-785020] N75-12142

ZIRCONIUM ALLOYS
A high resolution electron microscope study of the omega transformation in Zr-N 0b alloys
[AD-785267] N75-12137

PERSONAL AUTHOR INDEX

SCIENTIFIC AND TECHNICAL AEROSPACE REPORTS VOLUME 13 NUMBER 03

TYPICAL PERSONAL AUTHOR INDEX LISTING



Listings in this index are arranged alphabetically by personal author. The NASA accession number denotes the number by which the citation is identified.

A

AAMODT, R. L. N75-12388
AANNESTAD, P. A. N75-12737
AARONSON, M. N75-12861
ABBOTT, N. J. N75-11902
ABERNATHY, R. J. N75-12691
ABRAM, P. N75-12425
ABRAMS, R. L. N75-12317
ABSHIRE, D. J. N75-12221
ADAM, J. N75-12793
ADAMS, R. M. N75-12583
ADAMSON, T. C. N75-12257
ADCOCK, J. B. N75-12000
N75-12001
ADEYEMI, O. N75-12171
ADLER, E. L. N75-12702
AGGARWAL, J. K. N75-12218
AGREN, C. H. N75-12283
AIREY, J. R. N75-12315
ALDRICH, R. C. N75-12402
ALEKSEYEV, D. A. N75-12564
ALESHINA, A. M. N75-12527
ALEXANDER, R. N75-12398
ALISHOUSE, J. N75-12400
ALLEGRE, J. N75-12224
ALLEN, R. P. N75-12166
ALM, K. F. N75-12126
ALTMANN, H. M. N75-11957
N75-11958
N75-11959
N75-11960
ALTYMYSHEV, A. A. N75-12559
ALZNER, E. N75-12260
AMBATYELLO, L. S. N75-12570
AMBROZIAK, A. N75-12839
AMOS, D. E. N75-12683
ANDERSON, C. G. N75-12444
ANDERSON, E. E. N75-12621
ANDERSON, J. L. N75-12456
ANDERSON, K. A. N75-12871
ANDERSON, M. C. N75-11966
ANDERSON, R. N75-12082
ANDERSON, T. O. N75-12652
ANDERSSON, L. N75-12654
ANDERSSON, O. N75-12889
ANDREEVA-GALANINA, E. C. N75-12584
ANDRESS, J. L. N75-12351
ANDRONOV, I. M. N75-12065
N75-12066
ANG, B. T. N75-12650
ANGER, E. N75-12346
ANTSYFEROV, S. M. N75-12520
ARAD, U. B. N75-12857
AREDAL, T. N75-12287
ARENS, V. N75-12386
ARMATA, J. F., JR. N75-12712
ARMISTEAD, R. A. N75-12768
ARNBORG, S. N75-12655
ARNOLD, C. B. N75-12321
ARNOLD, J. B. N75-12305
ARNOLD, J. T. N75-12459
ARROWSMITH, H. W. N75-12166
ARTANOVA, A. K. N75-12511
ARTISHUK, V. N. N75-12566
ARTSIMOVICH, L. A. N75-12066
ASTRUP, T. N75-12132
ASYAMOLOV, B. F. N75-12565
ATTERBY, P. N75-12129
ATTERIDGE, D. N75-12116
AURELL, C. N75-12175
AUSTEGARD, A. N75-12470
AXELSON, G. N75-12286

B

BACKER, D. C. N75-12887
BAILEY, A. B. N75-12112
BAILY, A. B. N75-12264
BAKER, B. S. N75-12451
BAKHIR, L. P. N75-12114
BALAKRISHMAN, A. V. N75-12671
BALCERAK, J. C. N75-12261
BALKWILL, J. K. N75-12100
BALLARD, R. D. N75-12543
BAMBERGER, E. N. N75-12330
BAMERT, A. E. N75-12850
BARBEE, L. G. N75-11957
N75-11958
N75-11959
N75-11960
BARDUSCH, R. E. N75-12003
BARNET, F. R. N75-12085
BARNETT, D. M. N75-12379
BARNWELL, T. P. N75-12191
BARRON, R. L. N75-12188
BARROWS, W. N75-12763
BARSUKOV, I. A. N75-12066
BARTLETT, R. J. N75-12213
BARTRAN, D. S. N75-12694
BATE, J. N75-11998
BATT, J. R. N75-12362
BAUM, D. W. N75-11907
BAUMEN, W. J., JR. N75-12891
BAYER, A. N75-12439
BEACHEY, J. E. N75-12113
BEAGQVIST, K. N75-12455
BEARD, D. S. N75-12445
BEARDSLEY, R. C. N75-12542
BEAUVAIS, C. N75-12130
N75-12131
BECKLIN, E. E. N75-12861
BEKEY, G. A. N75-12382
BELKANIYA, G. S. N75-12555
BELLER, M. N75-12443
BEMENT, L. J. N75-12326
BENEDICT, B. A. N75-12456
BENNETT, W. R. N75-12844
BENSON, R. B., JR. N75-12115
N75-12116
BENTHUSEN, D. E. N75-12642
BENTLEY, H. T., III N75-12324
BERGMAN, C. A. N75-11953
BERGQVIST, K. N75-12454
BERGSTRESSER, K. N75-12845
BERKE, L. N75-12358
BERKO, F. W. N75-12873
BERLYAND, M. Y. N75-12506
BERMAN, P. A. N75-12433
BERNATOWICZ, K. N75-12830
N75-12831
BESSON, R. N75-12707
BEST, L. V. N75-11963
BETH, M. U. N75-12790
BEY, P. P. N75-12318
BIGELEISEN, J. N75-12075
BILL, R. C. N75-12124
BISHOP, V. S. N75-12582
BIZIN, Y. P. N75-12556
BJUREL, G. N75-12676
N75-12677
BLACKBURN, W. E. N75-11903
BLANCHARD, M. N75-12301
BLASS, W. E. N75-12088
BLEICH, H. H. N75-12381
BLINOV, V. V. N75-11920
BLOMQUIST, A. N75-12175
N75-12705
BLOMQVIST, G. N75-12288
BLOOD, M. R. N75-12615
BLOTTNER, F. G. N75-12253
BLUM, F. A. N75-12325
BLUM, K. N75-12582
BOHN, W. L. N75-12790
BOKHOV, B. B. N75-12563
BOLDT, E. A. N75-12862
N75-12863
BOLLINGER, R. R. N75-12596
N75-12603
BOLOTIN, V. V. N75-12349
BOLSHAKOV, I. V. N75-12239
BONEY, L. R. N75-12244
BONRUD, L. O. N75-12420
BORDEAUX, J. N75-11967
BOUGHNER, R. E. N75-12880
BOURNE, H. C., JR. N75-12694
BOWDEN, J. N. N75-12160
BOWER, C. A., JR. N75-12534
BOWSER, G. C. N75-12450
BOYDEN, R. P. N75-11898
BRACK, K. N75-12146
BRADDOCK, W. F. N75-12022
BRADFORD, D. F. N75-12423
BRADLEY, H. H., JR. N75-12158
N75-12159
BRADLEY, J. N75-12672
BRAILOVSKII, I. L. N75-12239
BRANNON, P. J. N75-12304
BRAUERMAN, E. M. N75-12632
BRAUM, J. M. N75-12679
BRAUSER, K. N75-12609
BRAY, K. N. C. N75-12094
BRAZTSOV, I. P. N75-12376
BREIMAN, L. N75-12689
BREITER, A. L. N75-12110
BRICTSON, C. A. N75-12594
N75-12598
N75-12599
BRIGGS, A. H. N75-12582
BRIGGS, G. P. N75-12155
BRIOT, M. N75-12067
BROBERG, H. N75-12344
BROCHET, P. N75-12482
BROMLEY, E. N75-12323
BROOKS, R. L. N75-12407
BROWN, F. J. N75-12331
BROWN, R. J. N75-12467
BROWN, W. K. N75-12877
BROWNING, A. C. N75-12591
BROWNLEE, G. R. N75-12028
BRUCE, E. P. N75-11991
BRUSCH, R. N75-12423
BRYAN, B. A. N75-12279
BRYAN, R. H. N75-12721
BUCKLAND, N. M. N75-12097
BUDYKO, M. I. N75-12508
BUECHER, H. N75-12165
BUECHNER, M. N75-12579
BUGAYEVA, I. V. N75-12494
BUHRMAN, R. A. N75-12708
BUNTZEN, R. R. N75-12303
BURHANS, R. W. N75-12209
BURKDOLL, F. B. N75-11966
BURKHARDT, D. N75-11942
BURLAGA, L. F. N75-12874
BURLUTSKIY, R. F. N75-12512
BURNETT, T. D. N75-12709
BURNS, K. L. N75-12415
BURTON, T. E. N75-12258
BUSH, A. M. N75-12191
BUTMAN, B. N75-12542

C

CABARET, M. N75-12224
CAHN, C. R. N75-12177
CAIRNS, J. L. N75-12540
CAMAIONI, J. E. N75-12458
CAMERON, B. W., JR. N75-12040
CAMMAS, H. N75-12196
CAMP, R. N. N75-12451
CAMPBELL, G. F., JR. N75-11957
N75-11958
N75-11959

CANO, G. L. N75-11960
CANO, G. L. N75-12304
CAP, F. N75-12808
CARLSON, H. W. N75-11930
CARRIER, O., JR. N75-12582
CARTER, W. M. N75-12580
CASHWELL, E. D. N75-12686
CASTRO, R. N75-12123
N75-12125
CATCHPOLE, B. G. N75-11976
CAVENY, L. H. N75-12060
CENCI, R. N75-12103
CHAINOVA, L. D. N75-12575
CHAMPAGNE, F. H. N75-12540
CHAMPAGNE, L. N75-12315
CHAN, Y. K. N75-12819
CHANG, A. L. N75-12137
CHANG, D. T. N75-12406
CHAPPELOW, J. W. N75-12591
CHARLES, T. G. N75-12210
CHARNES, A. N75-12845
CHASE, L. M. N75-12871
CHASSAING, P. N75-12274
CHEBAN, V. G. N75-12820
CHEN, C. C. N75-12771
CHEN, C. H. N75-12186
CHEN, L. J. N75-12765
CHEO, B. R. N75-12805
CHERLOW, J. N75-12308
CHERNIKOV, A. A. N75-12528
CHICK, M. C. N75-12155
CHILDRESS, J. S. N75-12844
CHING, B. K. N75-12481
CHIRON, B. N75-12192
CHIROUZE, M. N75-12027
CHIU, H. H. N75-11992
CHIU, Y. T. N75-12481
CHOW, S. M. N75-12701
CHREPTA, M. M. N75-12712
CHUBUKOVA, A. L. N75-12510
CLARK, K. E. N75-12775
CLARK, S. K. N75-11929
CLARKE, J. F. N75-12727
N75-12815
CLEARY, J. W. N75-12031
CLEMENTS, T. R. N75-11972
CLIFF, W. C. N75-12462
CLINE, V. A. N75-12324
CNOSSEN, R. S. N75-12177
COLE, B. W. N75-12081
COLE, G. L. N75-11971
COLLINS, D. C. N75-12689
COLLINS, W. C. N75-12109
COMPTON, K. J. N75-12233
CONNELL, J. R. N75-12529
CORKINDALE, K. G. G. N75-12592
CORRIN, M. L. N75-12529
COSTES, A. N75-12027
COSTES, D. N75-11899
COSTOGUE, E. N. N75-12064
COULMI, G. N75-12225
COX, C. S. N75-12540
COX, K. E. N75-12434
COYLE, L. M. N75-12756
CRAIG, R. S. N75-12076
N75-12108
CREEKMORE, S. P. N75-12481
CRIZ, D. S. N75-12621
CROSWELL, T. L. N75-12005
CUDERMAN, J. F. N75-12304
CUPPS, F. J. N75-12367
CURRY, R. E. N75-12617
CYRUS, W. L. N75-12370

D

DAENNER, W. N75-12728
DAHLGREN, S. D. N75-12166
DAILEDA, J. J. N75-12029
DAMON, E. G. N75-12550
DANAHER, T. J. N75-12752
DANBERG, J. E. N75-12259
N75-12262
DANE, D. H. N75-12616
DANH, H. Q. N75-11909
DARCHEN, J. N75-12484
N75-12485
N75-12486
DAUZVARDIS, P. A. N75-12458
DAVENPORT, E. E. N75-12000
DAVENPORT, S. M. N75-12681
DAVIDSON, R. G. N75-12093
DAVIS, J. R. N75-12711
DAVIS, R. T. N75-12256
DAVIS, T. C. N75-12032
DAVOLT, D. A. N75-12583
DAXBERG, K. N75-12207
DEBELL, A. G. N75-12745
DEBOO, G. J. N75-12757
DEBRUYNE, N. A. N75-12338
DELAMETER, W. R. N75-12379
DELLIN, T. A. N75-12817
DEMMA, F. J. N75-12323
DEMONTMOLLIN, J. M. N75-12181
DERBY, R. W. N75-12886
DESTROISMAISONS, P. E. N75-12355
DEVECCHIS, M. N75-12192
DIAMOND, S. M. N75-12756
DIBATTISTA, J. D. N75-12810
DICKEY, J. M. N75-12822
DICKS, J. B. N75-12807
DIEHL, R. N75-12284
DIFRUSCIO, D. J. N75-12467
DIGGES, K. H. N75-11952
DIMEFF, J. N75-12275
DINI, J. W. N75-12164
DITTMAR, J. H. N75-11978
DITTMER, P. H. N75-12882
DIVINE, N. N75-12869
DIVITA, E. L. N75-12870
DJEU, N. N75-12315
DOERBECK, F. H. N75-12325
DOREMUS, R. H. N75-12151
DOROFEYUK, A. A. N75-12632
DOUGAL, A. A. N75-12218
DOURMES, G. N75-12274
DOWNS, W. R. N75-12434
DOYLE, F. L. N75-12546
DRANE, L. W. N75-12038
DRISCOLL, R. S. N75-12402
DUDDECK, H. N75-12372
DUDLEY, I. T. N75-12721
DUGGAN, I. E. N75-12419
DULCHINOS, J. N75-12475
DUNN, M. G. N75-12827
DUPONT, A. A. N75-11947
DURING, G. N75-12095
DUSTIN, M. O. N75-11971

E

EAGLEMAN, J. R. N75-12405
EARLEY, D. E. N75-12055
EDELBAUM, T. N. N75-12020
EDMONDSON, A. J. N75-12366
EDSTRAND, H. N75-12250
EDWARDS, C. L. W. N75-11973
EICHHORN, F. N75-12365
EISNER, M. N75-12842
EKBOM, L. N75-12148
EKLUND, F. N75-12175
N75-12705
EKLUNDH, J. O. N75-12660
EKSTROM, M. P. N75-12646
ELIASSON, R. N75-12068
ELLIS, J. P., JR. N75-12596
ELROD, B. D. N75-11919
EMERY, A. F. N75-12367
ENDERIN, L. N75-12639
ENGAN, J. A. N75-12854
ENGLAND, M. N. N75-12378
ERIKSSON, B. N75-12890
ERIKSSON, K. H. N75-12849
ERMOLENKO, S. D. N75-11901
N75-12266
ESIPCHUK, I. V. N75-12066
ESPARZA, V. N75-12033
ESTILL, W. B. N75-12642
ESTRIN, G. N75-12347
EVANS, R. L. N75-12591
EVANS, R. S. N75-12436
EVERETT, C. J. N75-12686

F

FABRE, J. N75-12274
FAN, B. N75-12812
FANSLER, K. S. N75-12259
N75-12262
FARINHA-MARTINS, A. N75-12099
FARIS, S. M. N75-12812
FARNELL, G. W. N75-12696
N75-12697
FARQUHAR, R. W. N75-12012
FARRELL, D. E. N75-12825
FARSHI, B. N75-12359
FAUDE, D. N75-12439
FAZIO, G. G. N75-12740
FEE, J. J. N75-11919
FEENBERG, D. N75-12423
FEHN, U. N75-12811
FENN, J. B. N75-12263
FESSENDEN, T. J. N75-12725
FICK, G. N75-12657
N75-12658
FIDELLE, J. P. N75-12130
FILATKINA, L. A. N75-12560
FILIN, N. V. N75-12239
FISHMAN, H. N75-12423
FLETCHER, E. R. N75-12550
FLODBERG, S. N75-12241
FLOSDORFF, H. N75-11941
FOELSCHE, T. N75-12883
FORNAEUS, L. N75-12300
FORTENBERRY, J. N75-12028
FOSSUM, J. G. N75-12717
FOULON, J. N75-12847
FRANCIS, P. S. N75-12339
FREDERICK, C. N75-12744
FREE, L. M. N75-11964
FRIDMAN, V. T. N75-11920
FRIEBELE, E. J. N75-12106
FRIEDBERG, R. N75-12693
FRIEDLANDER, M. W. N75-12750
FRIEDRICH, L. A. N75-12077
FRIEDRICH, O. M., JR. N75-12218
FRIGO, A. A. N75-12457
FRITTS, H. C. N75-12536
FROGEL, J. A. N75-12861
FRYE, D. E. N75-12457
FUCHS, K. N75-12365
FUELBERG, H. E. N75-12531
FUJII, C. T. N75-12136
FULLER, E. L., JR. N75-12881
FURNER, R. L. N75-12086
FUSSELL, J. B. N75-12641

G

GADZHIEV, M. I. N75-12203
GAJENDAR, N. N75-12464
GALLAGHER, J. P. N75-11955
GALLAGHER, R. H. N75-12364
GALLAGHER, T. F. N75-12718
GALLE, R. R. N75-12562
GAMMAGE, R. B. N75-12881
GARCIA, R. N75-12588
GARDNER, J. A. N75-12064
GARSWORTHY, R. K. N75-12091
GAUTIER, B. N75-12791
GAVRIOLVA, M. K. N75-12525
GAYLE, J. B. N75-12690
GELLATLY, R. A. N75-12362
GENET, R. M. N75-11918
N75-11922
GENOT, J. N75-11977
GENTRY, A. E. N75-12056
N75-12057
GERASCHENKO, O. A. N75-12280
GERBER, K. A. N75-12802
GERBERICH, W. W. N75-12116
GERBIER, N. N75-12482
GERO, A. J. N75-12529
GERWIN, H. J. N75-12717
GEYER, H. N75-12197
GIBBS, M. N75-12549
GIBSON, W. C. N75-12755
GIGAS, G. N75-12870
GILBERT, J. N75-12301
GILL, S. P. N75-11907
GILLINS, R. L. N75-12031
GINGERICH, M. E. N75-12109
GINOUX, J. J. N75-12269
GLASER, A. R. N75-12010
GLIBERT, K. M. N75-12304
GLINSKIY, N. T. N75-12516
GLOMOZDA, A. A. N75-12489
GOEBEL, J. N75-12750
GOETHERT, B. H. N75-11944
N75-11950
GOETTLER, L. A. N75-12084
GOLDMAN, D. N75-11917
N75-11919
N75-11928
GOLENETSKII, S. V. N75-12281
GOLLWITZER, H. N75-12609
GOLOVANOV, Y. N75-12013
GOODE, R. J. N75-12135
GOODWIN, G. M. N75-12349
GOODYER, M. J. N75-12000
GORDON, M. P. N75-12074
GORDON, W. B. N75-12715
GORNAGO, V. A. N75-12565
GRANBOM, P. O. N75-12154
GRATZL, K. N75-12610
GRAVIS, G. F. N75-12525
GRAY, D. M. N75-12823
GRAY, H. R. N75-12128
GREEB, M. E. N75-12759
GREEN, J. A. S. N75-12142
GREEN, W. H. N75-12315
GREENE, F. T. N75-12113
GREENE, M. W. N75-11967
GREGG, M. C. N75-12540
GRIEB, H. N75-11948
GRIFFITH, R. V. N75-12726
GRIGORYEV, A. A. N75-12463
GRISCOM, D. L. N75-12106
GRISHINA, I. M. N75-12570
GRISSA, A. N75-12225
GRISSOM, J. T. N75-12795
GROENEWEG, J. F. N75-11978
GROSS, J. N75-12423
GROSSKURTH, J. F., JR. N75-12364
GROSSMAN, L. N75-12548
GRUNDY, P. A. N75-11916
GRUNHOFER, H. J. N75-12611
GULLBERG, K. N75-12299
GUPTA, V. P. N75-11919
N75-11925
GUSEMAN, L. F., JR. N75-12675

GUSTAFSON, T. K. N75-12812
GUYOL, N. B. N75-12432
GWILT, S. R. N75-12002
GYLDEN, N. N75-11894

H

HABEGGER, L. J. N75-12458
HACKETT, C. E. N75-12311
HAEHNER, C. L. N75-12144
HAERENDEL, G. N75-12774
HAGGARD, K. V. N75-12880
HAGLUND, C. N75-11934
HAHN, O. N75-12365
HAIGH, T. I. N75-12339
HAIN, A. P. N75-12297
HAINES, A. N75-11925
HAINES, R. F. N75-12604
HAKKILA, E. A. N75-12104
HALBRITTER, G. N75-12439
HALE, H. B. N75-12596
HALL, B. A. N75-12054
HALL, E. C. N75-12345
HAMED, A. N75-12227
HAMILTON, G. D. N75-12541
HAMMEL, E. F. N75-12213
HAMMER, E. W., JR. N75-11956
HAMMER, M. W. N75-12037
HANASZ, J. N75-12833
HANCOCK, J. K. N75-12315
HANDLEY, J. C. N75-11990
HANNA, N. N. N75-12212
HANSEL, J. M. N75-12104
HANSSON, I. N75-12344
HARA, T. N75-12778
HARDY, E. E. N75-12397
HARDY, N. N75-12405
HARDY, W. H., II N75-12107
HARMS, D. W. N75-12680
HARRIS, G. O. N75-12122
HARRIS, R. M. N75-11919
N75-12481
HARTMAN, B. O. N75-12588
N75-12596
N75-12603
HARTRANFT, R. J. N75-12353
HARVEY, R. V. N75-12167
HARVILL, W. E. N75-11937
HARWIT, M. N75-12744
HASSELROT, A. N75-12247
N75-12545
HATFIELD, L. N75-12646
HATT, D. J. N75-12331
HAUGAN, W. J. N75-11984
HAWTHORNE, J. R. N75-12141
HAYES, L. L. N75-12646
HAYS, E. E. N75-12543
HAZEN, N. L. N75-12756
HEALY, G. J. N75-11982
HEDBERG, A. N75-12472
HEDLUND, R. C. N75-12757
HEINEMANN, K. N75-12732
HELGESON, H. G. N75-12586
HELLWARTH, R. N75-12308
HELSEL, V. E. N75-11999
HENDERSON, D. B. N75-12729
HENDERSON, R. E. N75-11991
HENRIKSON, P. J. N75-12420
HEPLER, L. J. N75-11964
HERGENROEDER, R. E. N75-12854
HERRMANN, G. N75-12379
HERRMANN, K. H. N75-12291
HERRMANN, W. N75-12682
HERTZBERG, O. N75-12247
HESS, F. R. N75-12543
HIBBEN, S. N75-12316
HILL, L. A. N75-12147
HILL, R. M. N75-12718
HIRSHMAN, S. P. N75-12815
HOCHEID, B. N75-12130
N75-12131
HOELZEL, W. N75-12579
HOERNQVIST, N. N75-12249
HOF, G. J. N75-12335
HOFFER, J. K. N75-12213
HOFFER, R. M. N75-12390
HOFFMAN, K. C. N75-12440
N75-12441
HOFFMANN, P. N75-12790
HOFFMANN, W. F. N75-12737
HOGMAN, B. N75-12576
HOHLFELDER, J. J. N75-12304
HOLBERTON, F. E. N75-12628
N75-12629
HOLDEN, F. M. N75-12593
HOLGERSSON, S. N75-12853
HOLGUIN, A. N75-12858
HOLLAHAN, J. R. N75-12087
HOLLER, E. N75-12663
HOLLYDAY, E. F. N75-12401
HOLM, L. N75-12298
HOLMBERG, C. N75-12247
HOLMES, H. F. N75-12881
HOLMES, H. H. N75-12661
HOLT, J. M. N75-11921
HOLT, S. S. N75-12862
N75-12863
HOOP, J. M. N75-12271
HOOVER, W. R. N75-12370
HOPPIN, R. A. N75-12395
HOUCK, W. H. N75-12270
HOW, J. N75-12760
HOWE, T. L. N75-12273
HUANG, T. C. N75-12184
HUBBLE, L. N75-12422
HUBER, P. W. N75-12205
HUDDLESTON, J. H. F. N75-12590
HUDSON, M. N75-12857
HUEBNER, K. N75-12145
HUFFAKER, R. M. N75-12462
HUGGINS, R. A. N75-12140
HUGHES, H. M. N75-12588
HUGUENIN, D. N75-12753
HULME, B. L. N75-12645
HUNT, D. E. N75-11918
HUNTAU, H. N75-12103
HURD, D. N75-12422
HURLBURT, D. H. N75-12698
HUTCHINSON, J. N75-12602

I

IGRA, O. N75-12804
IH, C. N75-12293
ILGAMOV, A. A. N75-12380
ILINSKII, V. N. N75-12281
INGEBO, R. D. N75-12070
N75-12334
INGER, G. R. N75-12254
IRONS, F. M. N75-12178
ISRAELSON, H. N75-12465
ITOH, T. N75-12778
IVANOV, A. N75-12834
IVANOV, V. F. N75-12497
IVLEV, L. S. N75-12479
N75-12509
IYER, R. R. N75-11917
IZRAEL, Y. A. N75-12719

J

JACKEL, G. N75-12121
JACOBOWITZ, H. N75-12400
JACOBS, W. F. N75-11943
JACOBSON, M. R. N75-12744
JAEGER, H. N75-12781
JAHN, R. G. N75-12775
JAMES, S. N. N75-12198
JAMES, W. R. N75-12389
JANSSON, B. N75-12096
JANZON, B. N75-11895
JAYARAMAMURTHY, S. N. N75-12692
JELINEK, D. A. N75-12179
JENKE, L. M. N75-11908
JENNINGS, D. E. N75-12088
JENNINGS, R. E. N75-12738
JOECKLE, R. N75-12791
JOENSSON, L. N75-12344
JOHANSSON, R. N75-12577
N75-12586
JOHNSON, C. B. N75-12243
JOHNSON, H. K. N75-11993
JOHNSON, J. D. N75-12022
JOHNSON, K. R. N75-12621
JOHNSON, P. C. N75-12016
JOHNSON, P. R. N75-12003
JOHNSON, W. G., JR. N75-11896
JOHNSSON, A. N75-11894
JOHNSTON, J. R. N75-12128
JONCAS, K. P. N75-12199
JONES, E. D. N75-12304
JONES, J. J. N75-12880
JONES, R. K. N75-12550
JOPPA, R. M. N75-12157
JOSEPH, R. D. N75-12750
JOURNEAY, C. H. N75-12646
JUDY, R. W., JR. N75-12135

K

KABACHENKO, A. N. N75-12557
KACHURIN, L. G. N75-12515
KAIJSER, T. N75-12387
N75-12538
KANG, S. F. N75-12021
KANNOLT, J. R. N75-12336
KANTARGES, G. T. N75-11988
KAPITANOV, V. A. N75-12528
KARDAS, G. E. N75-11896
KARNAUKHOVA, N. A. N75-12569
KARPOV, N. I. N75-12584
KASHPOROV, L. Y. N75-12110
KATKOVSKIY, B. S. N75-12565
KATTAMIS, T. Z. N75-12017
KATTAWAR, G. W. N75-12674
KAUFMAN, L. G., II N75-12243
KAWABE, T. N75-12778
KAWAI, Y. N75-12778
KAWAMURA, R. N75-12246
KAY, J. F. N75-12151
KAYS, A. O. N75-11937
KEBABIAN, P. L. N75-12866
KEDDY, E. S. N75-12252
KEFFER, F. N75-12824
KELBER, G. N75-12089
KELEJIAN, H. H. N75-12423
KELLER-MEYER, D. A. N75-12458
KELLER, R. F. N75-12680
N75-12684
KELLER, W. E. N75-12213
N75-12447
KENDALL, D. P. N75-12149
KENNEDY, J. N75-12139
KENNEDY, W. E. N75-12009
KERN, P. R. A. N75-11984
KERR, E. C. N75-12213
KESTELL, J. R. N75-12615
KHANDELWAL, G. S. N75-12573
KHILOV, K. L. N75-12561
KHLEBNIKOVA, L. A. N75-12478
KHOT, N. S. N75-12358
KILGORE, R. A. N75-12000
N75-12001
KIM, D. K. N75-12116
KING, R. T. N75-12369
KING, R. W. P. N75-12219
KINOSHITA, K. N75-12117
KITAYEV-SMYK, L. A. N75-12562
KLAMKA, J. N75-12840
KLEIN, K. F. N75-12607
KLEIN, M. B. N75-12317
KLEIN, P. H. N75-12109
KLEINMANN, D. E. N75-12740
KLEINSCHMITT, D. N75-12293
KLEJMAN, H. N75-12841
KLESHCHENKO, A. D. N75-12518
KLESTADT, B. N75-12026
KLIMA, R. N75-12131
KLING, M. N75-12790
KLOCHKOV, A. M. N75-12562
KLOHN, K. L. N75-12712
KLUSSMANN, W. N75-11948
KLYUCHNIKOVA, L. A. N75-12514
KNIGHT, W. E. N75-11968
KNORR, G. E. N75-12801
KNUTSON, M. A. N75-12422
KOCK-NOMMENSEN, E. N75-12286
KOENBERG, E. N75-12636
N75-12849
KOEPER, F. W. N75-12356
KOJIMA, J. N75-11936
KOLESNIKOVA, L. A. N75-12516
KOLLBERG, E. N75-12175
KOMAROVA, I. A. N75-12575
KONDO, Y. N75-12746
KONDRATYEV, K. Y. N75-12509
KONONENKO, L. G. N75-12523
KONSTANTINOV, A. R. N75-12499
KOONTZ, O. L. N75-12747
KOPAZ, J. P. N75-12773
KOPYLOV, A. P. N75-12504
N75-12505
KORMAN, S. N75-12021
KORNILOVA, L. N. N75-12563
KOS, J. M. N75-11996
KOVACS, S. J. N75-12872
KOVALENKO, V. A. N75-12518
KOZUBSKII, K. N. N75-12066
KRAG, W. E. N75-12024
KRAKOW, W. N75-12137
KRAMER, J. N75-12098
KRAUSE, S. N75-12787
KROECK, R. M. N75-12422
KRUEGER, A. J. N75-12469
KRUELLE, G. N75-12785
KRUMBEIN, W. C. N75-12389
KRUPINA, T. N. N75-12564
KRZYWOBLOCKI, M. Z. V. N75-12228
N75-12229
N75-12230
KRZYZANOWSKI, R. N75-12184
KUBARA, R. S. N75-12751
KUCZERA, H. N75-12782
KUNHARDT, E. E. N75-12805
KUO, B. C. N75-12669
KURTZ, R. N75-12749
KUSHNIR, V. F. N75-12203
KUZMIN, I. A. N75-12478

L

LACHAMBRE, J. L. N75-12301
LADD, G. O., JR. N75-12313
LAEVASTU, T. N75-12541
LAFFERTY, J. F. N75-12580
LAKTIONOV, A. G. N75-12503
LAMART, R. M. N75-11994
LAMB, M. N75-12235
LANDAU, C. N75-12662
LANDES, K. N75-12786

LANDRAULT, C. N75-12027
N75-12067
LAPIN, B. A. N75-12555
LAPRIE, J. C. N75-12027
LAQUER, H. L. N75-12814
LARSSON, G. N75-12023
LATHROP, J. F. N75-12683
LAWLEY, K. L. N75-12325
LAZAREVA, N. A. N75-12514
LAZUTIN, L. L. N75-12478
LEE, H. A. N75-12163
LEE, K. N75-12410
N75-12412
LEE, Y. N75-12474
LEENOV, D. N75-12217
LEGRIVES, E. N75-11977
LEHMANN, M. N75-12768
LEIBOWITZ, L. P. N75-11997
LEIJONHUFVUD, S. N75-12638
LEON, B. J. N75-12184
LESHNER, M. D. N75-11974
LEVASHENKO, G. I. N75-12114
LEVCHENKO, I. M. N75-12066
LEVY, A. N75-12377
LEWIN, W. H. G. N75-12743
LILLEY, R. W. N75-11911
N75-11912
LIMA, S. N75-12615
LIN, M. C. N75-12315
LIN, P. M. N75-12184
LIN, R. P. N75-12871
LINDAU, I. N75-12821
LINDEBORG, B. N75-12298
LINDER, G. N75-12073
LINDNER, G. N75-12453
LINDQUIST, G. H. N75-12321
LINDQUIST, R. N75-12175
N75-12705
LINDSAY, S. J. E. N75-12591
LINDSTRAND, H. O. N75-12176
N75-12299
LINNROS, H. N75-12859
LINS, H. F., JR. N75-12398
LIPATOV, A. S. N75-12777
LIPATOV, V. B. N75-12463
LITSOV, A. N. N75-12566
LITTERST, F. J. N75-12119
LO, C. F. N75-12008
LOCKWOOD, V. E. N75-11932
LOEF, S. N75-12530
N75-12624
LOGAN, B. G. N75-12802
LONG, S. E. N75-12450
LORBER, A. K. N75-12248
LORELL, K. R. N75-12758
LOSS, F. J. N75-12141
LOUET, J. N75-11913
LOUIS, H. N75-12237
LOW, F. J. N75-12740
N75-12749
LOZANO, P. N75-12588
LUCENA, C. N75-12347
LUCENA, C. J. N75-12643
LUDVIGSSON, S. N75-12286
LUKYANOV, N. K. N75-12554
LUMELSKIY, V. Y. N75-12632
LUMPKIN, C. K. N75-12878
LUNDBOM, P. O. N75-12175
LUNDY, R. M. N75-12627
LUU, T. S. N75-12225

M

MACCALLUM, C. J. N75-12817
MACDAVID, K. S. N75-12276
MACK, R. J. N75-11893
MACKENZIE, W. E. N75-11968
MACNAMARA, W. D. N75-12595
MAEKILAE, K. N75-12634
MAISEL, G. N75-12118
N75-12520
MAKAROVA, T. F. N75-12527
MAKSIMENKOVA, T. A. N75-12192
MALDANT, J. L. N75-12409
MALILA, W. A. N75-12058
MALONE, G. A. N75-12059
N75-12036
MALONE, T. B. N75-12110
MALTSEV, V. M. N75-12626
MALTSEV, V. V. N75-11920
MALYSHEV, V. M. N75-12435
MANN, D. B. N75-12688
MANNOS, J. L. N75-11931
MANTAY, W. R. N75-12526
MARAKHOVSKIY, V. S. N75-12490
MARCHUK, G. I. N75-12675
MARION, B. P. N75-12571
MARKARYAN, M. V. N75-12784
MARLIER, S. F. N75-12196
MARPINARD, J. C. N75-12106
MARQUARDT, C. L. N75-12543
MARQUET, W. M. N75-12004
MARSH, H. S. N75-12641
MARSHALL, N. H. N75-12147
MARSON, F.
MARTIN, J. A. N75-12063
MASGORET, R. C. N75-12868
MASRI, S. F. N75-12382
MASSENGALE, E. W. N75-12448
MATARAZZO, A. N75-11932
MATTHEWS, A. T. N75-12381
MATTHEWS, K. N75-12861
MATTHEWS, R. D. N75-12269
MATTSSON, A. N75-12716
MAUL, G. A. N75-12396
MAX, J. N75-12180
MAYHAN, J. T. N75-12189
MAZETS, E. P. N75-12281
MCCAMIS, M. J. N75-12543
MCCARTHY, D. K. N75-12012
MCCASLIN, M. N75-12396
MCCORMICK, B. H. N75-12664
N75-12670
N75-12692
MCCOY, B. J. N75-12038
MCCOY, J. E. N75-12871
MCDONALD, G. E. N75-12329
MCDONALD, J. F. N75-12713
MCDONALD, T. E. N75-12213
MCFARLAND, R. H. N75-12009
MCGUIRE, R. E. N75-12871
MCHUGH, W. B. N75-12598
N75-12599
MCMENAMIN, J. C. N75-12821
MCNEE, R. C. N75-12596
MCNEILL, L. H. N75-11903
MCNIEL, D. O. N75-12037
MCPHERSON, F. D. N75-12093
MEDINA, M. A. N75-12582
MEIER, E. N75-12597
MEINJES, K. N75-12640
MEISEL, W. S. N75-12689
MEITZLER, T. D. N75-11915
N75-11922
MEIXLSPERGER, R. N75-12232
MELESHKO, G. I. N75-12560
MELNICHUK, J. V. N75-12528
MELSHEIMER, S. S. N75-12547
MENNELL, R. N75-12035
MERSEREAU, R. M. N75-12183
MESSITER, A. F. N75-12257
MEYERS, W. D. N75-12711
MICHELS, J. H. N75-12323
MICOCCI, A. J. N75-12036
MIHALIK, G. R. N75-11907
MIKHAILICHENKO, V. A. N75-12066
MILAM, M. D. N75-12031
N75-12033
MILLER, D. S. N75-11930
MILLER, G. K., JR. N75-11933
MILLS, N. H. N75-12600
MILLS, S. M. N75-12272
MILNE, T. A. N75-12113
MILROY, R. A. N75-12340
MILUSHEV, P. N75-12835
MIMINO, T. N75-12117
MINEGISHI, I. N75-12117
MINTER, T. C., JR. N75-12419
MINYUSHINA, L. S. N75-12493
MINZNER, R. A. N75-12469
MIRANDA, H. A., JR. N75-12475
MIRANDA, H. P. N75-12475
MIRIN, A. A. N75-12251
MIRMIRANI, F. S. N75-12133
MITCHELL, R. H. N75-12187
MOEHLENKAMP, H. H. N75-12332
MOELLER, H. N75-12211
MOLCHANOV, V. S. N75-12809
MOLINIER, R. N75-12125
MOLOCHKOV, I. B. N75-12202
MONIER, A. N75-12062
MONROE, R. E. N75-12015
MONTAGUE, W. G. N75-12142
MOORE, B. H. N75-12419
MOORE, G. K. N75-12401
MOORE, R. N. N75-11914
MOROZOV, A. I. N75-12066
N75-12806
MORREALL, A. F. N75-12323
MORRIS, C. E. M. N75-12092
MORRIS, J. W., JR. N75-12120
MOSKALENKO, L. V. N75-12498
MOSKOWITZ, J. W. N75-12816
MOSS, J. B. N75-12094
MOSS, M. N75-12370
MOTOREV, N. G. N75-12626
MOW, C. C. N75-12449
MOYERS, J. C. N75-12442
MROZIEWICZ, B. N75-12837
MUCHNIK, V. M. N75-12523
MUHONEN, D. P. N75-12012
MUKHERJEE, S. K. N75-11975
MULCAHY, L. P. N75-12185
MULCAHY, T. M. N75-12371
MUNDRA, A. D. N75-11926
N75-11927
MURAKAMI, M. N75-12231
MURPHY, J. P. N75-12758
MURPHY, T. D. N75-12724
MURRAY, L. G. N75-12312
MUSAYELYAN, S. A. N75-12490
MUSCARI, J. A. N75-12011
MUSKIE, E. S. N75-12452
MUTHUKRISHNAN, M. N75-11990
MYERS, V. I. N75-12394
N75-12403

N

NAGIB, H. M. N75-12295
NAITOH, P. N75-12598
N75-12599
NAKAJIMA, T. N75-12246
NAKAMURA, T. N75-12231
NAKAMURA, Y. N75-12778
NALEPKA, R. F. N75-12409
NAUMANN, R. J. N75-12875
NEALY, J. E. N75-12880
NEIN, M. E. N75-12018
NEINER, G. H. N75-11971
NELP, W. B. N75-12581
NELSON, C. A. N75-12813
NETT, H. N75-12791
NEUGEBAUER, G. N75-12861
NEUHARTH, E. R. N75-11957
N75-11958
N75-11959
N75-11960
NEUMANN, H. E. N75-11970
NEUWERTH, G. N75-11951
NEWMAN, E. H. N75-12201
NICAISE, P. D. N75-12018
NICHOLSON, A. N. N75-12587
N75-12600
NICKEL, H. N75-12080
NIETO, M. M. N75-12876
NIKIFOROVA, N. K. N75-12503
NIKOLSKIY, G. A. N75-12509
NILLSON, G. N75-12175
NISHIOKA, K. N75-12277
NORD, C. E. N75-11961
N75-11962
NORDLANDER, S. N75-12176
NORDMANN, B. J., JR. N75-12664
N75-12670
NORGREN, C. T. N75-12070
N75-12334
NORR, M. K. N75-12085
NOSWORTHY, C. T. N75-12419
NOYES, R. W. N75-12740
NUCKOLLS, J. H. N75-12309

O

OBERIN, F. W. N75-12208
ODONNELL, R. D. N75-12603
OERNBERG, G. N75-12576
OETTE, H. N75-11892
OGORODNIKOVA, L. G. N75-12558
OLIVER, W. R. N75-12056
N75-12057
OLLENDORF, S. N75-12222
OLSSON, R. L. N75-12206
OLTHOF, H. N75-12741
ONANOV, G. G. N75-12376
ONDRIA, J. G. N75-12217
ONEAL, J. B. N75-12191
ONEILL, F. N75-12315
ONISHCHENKO, E. L. N75-12520
OREILLY, C. A., III N75-12843
ORHAUG, T. N75-12577
N75-12656
N75-12848
ORLENKO, L. R. N75-12514
ORMSBY, C. C. N75-12585
ORTEGREN, F. N75-12148
OSTROWSKY, D. B. N75-12193
OSTWALD, L. T. N75-12748
OTTENSOSER, J. N75-11954
OTTINGER, C. L. N75-12730

P

PADILLA, A., JR. N75-12102
PAIDOUSSIS, M. P. N75-12236
PALME, J. N75-12635
PALME, S. N75-11897
PALMER, M. A. N75-12304
PANCHENKO, V. S. N75-12565
PANSZA, A. J. N75-11995
PANTLE, A. N75-12612
PAPPERT, R. A. N75-12772
PAPUCHON, M. N75-12193
PARISI, G. N75-12828
PARKER, E. G. N75-12628
N75-12629
PARKER, R. H. N75-12870
PARRA, G. T. N75-12757
PATTEE, H. E. N75-12015
PATTMAN, J. D. R. N75-12467
PAUCKERT, R. P. N75-12069
PEARSON, P. H. O. N75-12466
PECSELI, H. L. N75-12796

PELLING, M. R. N75-12754
PELUSO, P. J. N75-12320
PENNEWELL, J. D. N75-12407
PERSSON, I. N75-12344
PERSSON, S. E. N75-12861
PESCHKA, W. N75-12780
PETERS, E. T. N75-12016
PETERS, H. J. N75-12006
PETERS, W. N75-12320
PETERSON, J. B. N75-12666
PETERSON, L. M. N75-12321
PETERSON, R. L. N75-11956
PETROSYANTS, M. A. N75-12502
PETROV, E. M. N75-12066
PETTERSSON, R. N75-12333
PFLUG, I. J. N75-12622
PIEPER, W. J. N75-12350
PINCKNEY, S. Z. N75-12234
PINKUS, A. L. N75-12350
PIPES, R. B. N75-12081
PITTS, K. J. N75-12762
PLACE, G. N75-11957
N75-11958
N75-11959
N75-11960
PLAKS, A. N75-11903
PLATOU, A. S. N75-11900
PLETT, E. G. N75-11974
N75-11992
PLUISTER, J. W. N75-12295
PLUNKETT, W. H. N75-11914
POHN, H. A. N75-12413
POKROVSKAYA, Y. I. N75-12560
POKROVSKIY, O. M. N75-12492
POLCYN, F. C. N75-12408
POMETOV, Y. D. N75-12565
POPOV, E. I. N75-12110
POPOV, V. S. N75-12799
POSEY, J. W. N75-12233
POTEET, W. N75-12749
POTTER, L. R. N75-12276
POWELL, H. M. N75-12112
POWELL, J. E. N75-12304
POWELL, J. R. N75-12443
POWELL, W. B. N75-12276
POWERS, E. J. N75-12218
POWERS, W. F. N75-12631
POZVONKOV, F. M. N75-12239
PRAJOUX, R. N75-12196
PRESTEL, D. N75-12106
PRIDDLE, E. K. N75-12368
PRODANOV, P. N75-12834
PROST, G. L. N75-12410
PROWSE, D. B. N75-12706
PU, C. L. N75-12020
PULCHER, E. T. N75-11986

Q

QUEMENER, Y. N75-12196
QUEMPER, F. N75-12131

R

RABUKHIN, L. G. N75-12519
RAFFIN, M. N75-12224
RAHMAN, A. R. N75-12621
RAMIREZ, E. N75-12480
RAMSEY, P. E. N75-12032
RANDIN, J. P. N75-12083
RAPIN, M. N75-12131
RAY, E. J. N75-12001
RAYTSES, V. S. N75-12553
RAZUMEYEV, A. N. N75-12555
REARDON, K. J. N75-12651
REASONER, D. L. N75-12714
REDDINGIUS, N. H. N75-11989
REES, F. L. N75-12770
REICHL, H. N75-12090
REILLY, J. J. N75-12440
N75-12441
REITER, R. N75-12477
RENGERS, E. C. N75-12534
REPLOGLE, C. R. N75-12593
RESHOTKO, E. N75-12268
REUTERSWAERD, C. N75-12633
N75-12653
RHEAULT, F. N75-12301
RHODES, C. K. N75-12303
RICCIUS, R. N75-11939
RICE, R. R. N75-12007
RICE, R. W. N75-12319
RICHARDSON, P. C. N75-12218
RICHARDSON, T. G. N75-12174
RICHMOND, D. R. N75-12550
RICKER, G. R. N75-12743
RISTIC, V. M. N75-12699
ROBBIANO, P. N75-12459
ROBELEN, D. B. N75-12195
ROBERTS, K. H. N75-12843
ROBERTSON, C. E. N75-12292
ROBISON, D. N75-12857
ROCKWOOD, S. D. N75-12794
ROGACHEV, G. V.
ROGERS, D. B.
ROGERS, P. H.
ROGERS, W. S., JR.
ROGGE, R. L.
ROGLER, H. L.
ROGOZIN, Y. A.
ROLFE, J. M.
ROMANO, G.
ROMANOV, M. K.
ROMANOVA, I. M.
ROMANOVSKII, M. K.
ROOT, W. L.
ROSCOE, S. N.
ROSE, A. M.
ROSENGREN, B.
ROSS, D. F., JR.
ROSSIGNOL, D.
ROTHENFUSSER, R.
ROTHSCHILD, R. E.
ROUX, C.
ROVNYKH, A. V.
RUDD, J. L.
RUDENKO, L. G.
RUNACRES, A.
RUNBORG, I.
RUNDKWIST, A.
RUSH, M.
RYAZANOVA, L. A.
RYLOV, I. P.
RZHEVSKIY, B. N.

S

SABADIL, H. N75-12803
SABODASH, P. F. N75-12820
SABOL, A. P. N75-12244
SAFFORD, F. B. N75-12382
SAGARA, K. N75-12678
SAITO, T. T. N75-12305
SAKOVICH, V. A. N75-12567
SALNIKOV, I. E. N75-12239
SAMOYLOV, V. A. N75-12521
SANDER, H. H. N75-12717
SANDERCOCK, D. M. N75-12245
SANDERS, C. T. N75-12238
SANGER, N. L. N75-12245
SANTESSON, J. N75-12659
SAPHIR, G. N75-11949
SARKES, L. A. N75-12435
SARKISYAN, A. S. N75-12497
SASS, S. L. N75-12137
SATTINGER, I. J. N75-12399
N75-12404
SAVVIN, A. B. N75-12554
SAZHINA, S. A. N75-12280
SCANLAN, L. A. N75-12614
SCHAEFER, H. J. N75-12574
SCHAENZER, G. W. N75-11945
SCHALL, W. N75-12789
SCHANFEIN, M. J. N75-12120
SCHMIDT, G. N75-12798
SCHMIDT, J. N75-12327
SCHMIDT, T. R. N75-12621
SCHMIDTKE, H. N75-12606
SCHMIT, L. A., JR. N75-12359
SCHMUCKER, R. H. N75-12061
SCHNEIDER, A. A. N75-12450
SCHNEIDER, I. N75-12109
SCHNEIDER, W. C. N75-12437
SCHOCK, W. N75-12789
SCHOENEBORN, C. N75-12072
SCHRIEMPF, J. T. N75-12314
SCHRYER, D. R. N75-12880
SCHWARZ, S. N75-11981
SCOTT, M. B. N75-12644
SCOTT, S. G. N75-12747
SCOTT, W. C. N75-12325
SCUKA, V. N75-12175
SEARCY, J. Q. N75-12263
SEARLES, S. K. N75-12315
SEATON, C. C. N75-12152
SEAY, T. S. N75-12183
SECKINGER, E. L. N75-12306
SEIFERT, R. N75-12609
SELLE, J. E. N75-12444
SELLERS, T. A. N75-12181
SEMENOV, Y. K. N75-12513
SENGERS, J. V. N75-12265
SERAFIN, F. L. N75-12339
SERAPHIN, L. N75-12123
N75-12125
SERLEMITSOS, P. J. N75-12862
N75-12863
SESHAN, K. N75-12765
N75-12766
SETCHELL, R. E. N75-12105
SHAMINA, O. G. N75-12468
SHAMPINE, L. F. N75-12681
SHATKAUSKAS, G. I. N75-12517
SHATZ, R. H. N75-12857
SHAW, R. J. N75-11970
SHCHERBAK, L. V. N75-11901
SHEER, C. N75-12593
SHEFFIELD, P. J. N75-12150
SHEPHERD, J. N75-12852
SHERREN, D. C. N75-12030
SHIH, T. T. N75-12268
SHIMADA, K. N75-11901
SHINODA, T. N75-12591
SHIPLEY, A. N75-12720
SHIVASHANKARA, B. N. N75-12722
SHULMAN, V. A. N75-12522
SICHKAR, V. A. N75-12066
SIGMAR, D. J. N75-12687
N75-11953
SIGNER, H. N75-12620
SIH, G. C. N75-12613
N75-12578
SILVER, L. W. N75-12731
SIMANEK, E. N75-12079
SIMMONS, A. J. N75-12597
SINGH, G. N75-12862
SINHA, A. N. N75-12863
N75-12131
SINSKY, J. A. N75-12266
SISSON, C. E. N75-11955
SITTERLEY, T. E. N75-12499
SIVIER, K. R. N75-11976
SKELTON, J. N75-12637
SKEWS, B. W. N75-12156
SKINNER, G. T. N75-12858
SKOELDSTROEM, B. N75-12494
N75-12065
SKOLNIK, M. I. N75-12521
SMARYSHEV, M. D.
SMERNOFF, B. J.
SMIT, J.
SMITH, C. M.
SMITH, E. G.
SMITH, J. H.
SMITH, R. A.
SMITH, R. D.
SMOLINSKI, A.
SMYTH, D. N.
SNEGEREV, V. A.
SNIDER, W. J.
SNYDER, R. F.
SOARD, T.
SOBIESZCZANSKI, J.
SOBOLEV, S. V.
SOKOLOVSKAYA, M. V.
SOMASUNDARAM, R.
SONIN, A. A.
SONNIER, C. S.
SPANNAGEL, G.
SPENCER, D. J.
SPICER, W. E.
SPITZER, H.
SPITZER, H. J.
SRIVASTAVA, B. N.
STAEBLEIN, H. G.
STAELIN, D. H.
STALLINGS, R. L., JR.
STALNAKER, H. D.
STAPLES, R. J.
STAUGAITIS, C. L.
STEBLYANKO, V. A.
STEGEMAN, G. I. A.
STEGER, P. J.
STEHFEST, H.
STEINBERG, M.
STEPHEN, W. A.
STEPHENS, J. R.
STERN, G.
STEWART, R. B.
STEYSKAL, H.
STIEGLER, J. O.
STIGBERG, J. D.
STIMSON, E. B.
STOCKER, H. L.
STOFFREGEN, W.
STOKES, R. A.
STOLIAR, A. P.
STRAHLE, W. C.
STRASSER, H.
STRAUS, J. M.
STREGACK, J. A.
STREUBEL, S.
STRICKLAND, G.
STRIMBECK, D. C.
STRIZHKOV, S. A.
STROEM, P.
STROH, R. W.
STRONG, I. B.
STRONG, J.
STROUD, D. B.
STUPNITSKIY, V. P.
SUCH, C. R.
SUESS, F.
SUKHODROVSKIY, V. L.
SULTANBAYEV, S. A.
SUMMERFIELD, M.
N75-12499
N75-12021
N75-12583
N75-12415
N75-12252
N75-12374
N75-12429
N75-12117
N75-12735
N75-11990
N75-12426
N75-12568
N75-12727
N75-12815
N75-12330
N75-12353
N75-12354
N75-12038
N75-12710
N75-12189
N75-12669
N75-11923
N75-11924
N75-12215
N75-12647
N75-11999
N75-11953
N75-11902
N75-12640
N75-12827
N75-12068
N75-12849
N75-12190
N75-12204
N75-12857
N75-12589
N75-11979
N75-11980
N75-11983
N75-12134
N75-12025
N75-12476
N75-12838
N75-12056
N75-12057
N75-12533
N75-12761
N75-12188
N75-12034
N75-12361
N75-12776
N75-12570
N75-12818
N75-12205
N75-12242
N75-12181
N75-12439
N75-12322
N75-12821
N75-12818
N75-12220
N75-12256
N75-12788
N75-12866
N75-12235
N75-11955
N75-11929
N75-12144
N75-12524
N75-12703
N75-12305
N75-12439
N75-12443
N75-12071
N75-12127
N75-12791
N75-12244
N75-12704
N75-12369
N75-12270
N75-12002
N75-12341
N75-12705
N75-12764
N75-12320
N75-11990
N75-12608
N75-12481
N75-12315
N75-12609
N75-12441
N75-12252
N75-12468
N75-12288
N75-12191
N75-12888
N75-12736
N75-12153
N75-12566
N75-12373
N75-12532
N75-12525
N75-12501
N75-11974
N75-11992
N75-12060

SUNDSTROEM, A. N75-12249
SURIKOV, O. M. N75-12479
SUYDAM, B. B. N75-12307
SVALGAARD, L. N75-12867
SVEDBERG, R. C. N75-12143
SVENNERUS, G. N75-12175
SWARTZ, B. K. N75-12685
SWEET, H. S. N75-11940
SWIFT, C. N75-12735
SWIFT, C. T. N75-12172

T

TABAKOFF, W. N75-12227
TAINOR, W. V. N75-12054
TAINOV, I. F. N75-12065
TAIT, J. N. N75-12383
TAKESHITA, T. N75-12076
N75-12108
TALAVRINOV, V. A. N75-12570
TALAY, T. A. N75-12537
TAN-ATICHAT, J. N75-12295
TANNER, D. B. N75-12708
TARRAS-WAHLBERG, E. N75-12890
TASHBAR, P. W. N75-12161
TAYLOR, E. W. N75-12733
TAYLOR, H. F. N75-12772
TAYLOR, J. M. N75-12039
TAYLOR, R. D. N75-12213
N75-12348
TEDRICK, R. N. N75-11988
TEIPEL, I. N75-12783
TEKNEDZHIEV, B. N75-12835
TEMPLEMAN, A. B. N75-12360
TENGROTH, B. N75-12576
N75-12578
TERBRAAK, F. N75-12601
THIESSEN, A. R. N75-12302
THOMAS, G. R. N75-12364
THOMAS, P. N75-12532
THOMPSON, P. F. N75-12310
THOMSON, F. J. N75-12391
N75-12392
THORBURN, J. N75-12576
THORNE, K. S. N75-12872
TIKHONOV, G. P. N75-12556
TILLER, W. N75-12788
TINGEY, D. L. N75-12393
TOBIAS, J. V. N75-12178
TOCANNE, D. N75-12192
TODT, J. N75-12285
TOKAR, J. V. N75-12457
TOMLINSON, H. S. N75-12742
TOMPKINS, G. E. N75-12643
TOTH, L. E. N75-12818
TOWLSON, W. A. N75-12742
TOWNES, C. H. N75-12865
TRANVANKAI, M. N75-12194
TREANOR, C. E. N75-12827
TRELA, W. J. N75-12213
TRICOT, R. N75-12123
N75-12125
TRIFONOV, I. V. N75-12065
TRUE, G. A. N75-12759
TSCHIRHART, G. N75-12483
TSUGE, S. N75-12678
TSYTOVICH, V. N. N75-12792
TUCKER, T. R. N75-12136
TULINIUS, J. R. N75-11935
N75-11936
TULLOS, J. N75-12425
TUNNEL, S. H. N75-12279
TURNER, J. M. N75-12874
N75-12884
TURULINA, G. K. N75-12496
TUTEUR, F. B. N75-12713
TUTUNGI, G. N75-12551
TUZOV, V. M. N75-12626
TVERSKAYA, N. P. N75-12495

U

ULBRECHT, G. N75-12597
ULRICH, R. R. N75-12342
URFRIG, D. B. N75-12648

V

VALKOV, Y. A. N75-12809
VANCE, R. W. N75-12267
VANIAN, L. L. N75-12777
VANRIPER, K. A. N75-12864
VANSTRATEN, F. W. N75-12188
VARVASHTYAN, V. M. N75-12559
VASBINDER, G. C. N75-12819
VASILYEV, V. K. N75-12554
VASILYEVA, T. D. N75-12564
VECCHIES, L. N75-12058
N75-12059
VELDMAN, H. F. N75-11985
VENIS, T. E. N75-12742
VERNON, S. N75-12858
VIAL, F. N75-12130
VIGNERON, F. N75-12363
VILKAUSKAS, L. L. N75-12517
VINCENT, R. K. N75-12417
VINSON, J. R. N75-12375
VIRCHENKO, O. V. N75-12518
VOLOSHIN, V. G. N75-12568
VONJASKOWSKY, W. N75-12775
VONZEIPEL, E. N75-12471

W

WAGNER, T. W. N75-12408
WAIDE, C. H. N75-12440
WAINWRIGHT, R. L. N75-12684
WALLACE, W. E. N75-12076
N75-12108
WALTERS, T. L. N75-12216
WANG, Y. Y. L. N75-12265
WARK, D. N75-12400
WASHINGTON, W. D. N75-11904
N75-11905
WASSERBAUER, J. F. N75-11970
WATSON, F. D. N75-11921
WATSON, K. N75-12413
WATT, W. S. N75-12315
WATTS, H. A. N75-12681
WATTS, J. C. N75-11964
WATTS, R. K. N75-12325
WAYPA, J. N75-12311
WEAR, T. G. N75-12214
WEBB, W. L. N75-11987
WEBER, F. P. N75-12402
WEBER, U. N75-12290
WEDE, W. L., JR. N75-12111
WEEKS, R. A. N75-12106
WEI, R. P. N75-12374
WEIST, G. N75-11948
WELLS, C. N75-12746
WEMPLE, R. P. N75-12101
WERDER, K. V. N75-12597
WERLE, M. J. N75-12256
WESSEL-BERG, T. N75-12826
WEST, D. G. N75-12625
WESTCOTT, P. A. N75-12011
WEWERINKE, P. H. N75-12589
WHITAKER, A. F. N75-12328
WHITE, A. H. N75-11994
WHITE, R. N. N75-12364
WHITE, R. P., JR. N75-12261
WHITLOCK, C. H. N75-12537
WICKERTS, S. N75-12705
WICKS, B. J. N75-12078
WIDEGREN, I. N75-12530
N75-12624
WIEGAND, C. L. N75-12636
WILBUR, R. L. N75-12414
WILCOX, D. C. N75-12619
N75-12226
WILD, R. L. N75-12710
WILKINS, J. R. N75-12272
WILLIAMS, G. O. N75-12540
WILLIAMS, J. M. N75-12544
WILLIAMS, L. F. G. N75-12122
WILLIAMS, T. C. N75-12544
WILLIS, D. B. N75-12618
WILLOUGHBY, H. E. N75-12535
WILMSEN, C. W. N75-12819
WILSON, J. W. N75-12573
WINTZER, D. N75-12439
WIRTH, M. C. N75-12646
WISANDER, D. W. N75-12124
WISWALL, R. H. N75-12440
N75-12441
WITTEBORN, F. C. N75-12735
WITZKE, W. R. N75-12127
WNUK, M. P. N75-12354
WOHLBERG, D. B. N75-12696
N75-12697
N75-12700
WOLFF, P. N75-12282
WOLSKO, T. D. N75-12458
WONG, K. L. N75-12767
WOOD, R. N75-12058
N75-12059
WOODS, D. F. N75-11995
WORRELL, R. B. N75-12645
WORTMAN, D. B. N75-12623
WRIGHT, E. L. N75-12740
WU, T. T. N75-12219
WYDEVEN, T. N75-12087
WYKES, R. C. N75-12006
WYMAN, C. L. N75-12273

Y

YAKIMENKO, I. P. N75-12799
N75-12800
YAKIMOVSKY, Y. N75-12734
YAKOVLEVA, I. Y. N75-12563
YAKUSHKOV, Y. V. N75-12566
YAMAKAWA, G. M. N75-11964
YAMAMOTO, M. N75-12465
YANAGI, M. N75-12231
YANDELL, E. L., JR. N75-12456
YANG, T. T. N75-12308
YARULLIN, K. K. N75-12564
YASUI, R. K. N75-12433
YEAGER, E. N75-12083
YEAGER, W. T., JR. N75-11931
YEFIMOV, V. A. N75-12491
YEMELYANOV, M. D. N75-12562
YEOMANS, D. K. N75-12012
YOST, E. N75-12411
YOUNG, W. H., JR. N75-11931
YU, P. L. N75-12672
N75-12845

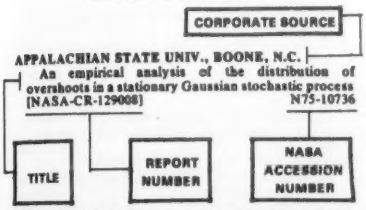
Z

ZACKAY, V. F. N75-12120
ZAGORODNY, A. G. N75-12800
ZAGRANSKI, R. D. N75-11994
ZAITSEV, V. A. N75-12203
ZAKKAY, V. N75-12260
ZALAY, A. D. N75-12261
ZALESAK, J. F. N75-12150
ZANDER, R. N75-12739
ZARETSKY, E. V. N75-12330
ZAVELSKAYA, N. A. N75-12500
ZERENIN, A. G. N75-12570
ZHUK, M. S. N75-12202
ZHUKOVA, L. B. N75-12560
ZHURENKO, V. N. N75-12560
ZIEN, T. F. N75-12255
ZIMMERMAN, G. B. N75-12302
ZIMMERMAN, R. I. N75-12278
ZIPF, E. C., JR. N75-12473
ZOBY, E. V. N75-12880
ZONABEND, F. I. N75-12575

CORPORATE SOURCE INDEX

SCIENTIFIC AND TECHNICAL AEROSPACE REPORTS VOLUME 13 NUMBER 03

TYPICAL CORPORATE SOURCE INDEX LISTING



Listings in this index are arranged alphabetically by corporate source. The title of the document provides the user with a brief description of the subject matter. The report number helps to indicate the type of document cited (e.g., NASA report, translation, NASA contractor report). The NASA accession number denotes the number by which the citation is identified. The titles are arranged under each corporate source in ascending accession number order.

A

ACADEMY OF SCIENCES [USSR], MOSCOW.
Interactions of fast particles with waves of cosmic magnetoactive plasma
[NP-20009] N75-12792

ACADEMY OF SCIENCES OF THE UKRAINIAN SSR, KIEV [USSR].
Electromagnetic fluctuations in the half-space of nonequilibrium plasma
[ITF-74-23P] N75-12799
Transition probabilities, correlation functions and dielectric permittivity tensors for semibounded and bounded nonequilibrium plasma
[ITF-74-21E] N75-12800

ADAPTRONICS, INC., MCLEAN, VA.
Refractive index measurements by adaptive techniques [RIMDAPT: Phases 1 and 1A]
[AD-785080] N75-12188

ADVANCED TECHNOLOGY LABS., INC., WESTBURY, N.Y.
Leeside flow field description over cones at large incidence
[AD-785369] N75-12260

ADVISORY GROUP FOR AEROSPACE RESEARCH AND DEVELOPMENT, PARIS [FRANCE].
Structural optimization
[AGARD-LS-70] N75-12357
Simulation and study of high workload operations
[AGARD-CP-146] N75-12587
AGARD index of publications, 1952 - 1970. Part 3: Author index. Part 4: Addendum to Part 1
[AGARD-INDEX-52/70] N75-12847

AEROJET NUCLEAR CO., IDAHO FALLS, IDAHO.
REBAL computer program series for linear propagation of uncertainty
[ANCR-1153] N75-12641

AERONAUTICAL RESEARCH LABS., MELBOURNE [AUSTRALIA].
Constant-volume gas turbine: Experiments with gaseous fuel in butterfly valved combustors
[ARL/ME-NOTE-347] N75-11976
The effect of neutron irradiation on the structure and mechanical properties of carbon fibres
[ARL/MET-REPT-93] N75-12078

AEROSPACE CORP., EL SEGUNDO, CALIF.
Cryogenic coolers for space systems
[AD-785083] N75-12267
Exploratory studies of diffusion laser modifications
[AD-785400] N75-12322
A three-dimensional numerical model of the upper atmosphere. Volume 2: Steady-state solutions for a single-fluid model with a fixed temperature field
[AD-778420] N75-12481

AEROSPACE GUIDANCE AND METROLOGY CENTER, NEWARK AIR FORCE STATION, OHIO.
Proceedings of Quarterly Meeting of Life Cycle cost task group of the joint services data exchange for inertial systems
[AD-785390] N75-11915
Proceedings of Quarterly Meeting of Life Cycle Cost Task Group of the Joint Services Data Exchange for Inertial Systems
[AD-785391] N75-11918
A description of a life cycle cost model for inertial navigation systems
[AD-785392] N75-11922

AEROSPACE MEDICAL RESEARCH LABS., WRIGHT-PATTERSON AFB, OHIO.
Simulation of high workload operations in air to air combat
N75-12593

AGRICULTURAL RESEARCH SERVICE, WESLACO, TEX.
Irrigation scheduling, freeze warning and soil salinity detecting
[E75-10046] N75-12414

AIR FORCE CAMBRIDGE RESEARCH LABS., L. G. HANSCOM FIELD, MASS.
Air Force Cambridge Research Laboratories balloon operations
N75-12752

AIR FORCE CIVIL ENGINEERING CENTER, TYNDALL AFB, FLA.
Liquid ice prevention and control chemicals for use on airfield pavements
[AD-785319] N75-12007

AIR FORCE EASTERN TEST RANGE, PATRICK AFB, FLA.
A compilation of papers presented at the On-Axis Software Conference
[AD-785218] N75-12649

AIR FORCE FLIGHT DYNAMICS LAB., WRIGHT-PATTERSON AFB, OHIO.
Development and applications of the air cushion landing system
N75-11952
A spectrum truncation and damage tolerance study associated with the C-5A outboard pylon aft truss lugs
[AD-785196] N75-11955
Use of optimality criteria methods for large scale systems
N75-12358
Dispersion-strengthened metal fin structural test
[AD-785374] N75-12378

AIR FORCE INST. OF TECH., WRIGHT-PATTERSON AFB, OHIO.
Depot requirements for base level data on aircraft inertial platforms
[AD-785443] N75-11914
Fighter aircraft engine dependability versus reconnaissance aircraft engine dependability when both aircraft use the same engine
[AD-785444] N75-11995
Design and fabrication of a versatile testing system for MNOS
[AD-785131] N75-12221
Input-output interfaces for the D17B bus-structured I/O system
[AD-785128] N75-12627
Discrete-time domain analysis of a two-axis beam deflector
[AD-785133] N75-12773
Some consequences of rapid managerial succession in complex organizations: A validation study
[AD-785442] N75-12844
Data acquisition and processing system for ultrasonic research
[AD-785127] N75-12852
An exploration into the practices of DCAS industrial specialists in obtaining contractor production information on high priority, medium value contracts
[AD-785441] N75-12854

AIR FORCE SYSTEMS COMMAND, WRIGHT-PATTERSON AFB, OHIO.
Application of the nonlinear theory of a listing surface to the calculation of aerodynamic characteristics of a triangular wing moving close to the earth's surface
[AD-785154] N75-11901
Combustion mechanism of particles of aluminum-magnesium alloys
[AD-785205] N75-12110
Method of sampling particles formed during burning of metallized condensed systems in constant-pressure chamber
[AD-785212] N75-12114
Nonlinear theory of a carrying surface in a non-compressible flow
[AD-785113] N75-12266
Principles of the reliability theory of mechanical systems, chapter 8
[AD-785209] N75-12349
Structural mechanics of skewed thin wall systems
[AD-785116] N75-12376
Dynamics of elastic shells containing acoustic medium with sources
[AD-785193] N75-12380
In the interests of clean air
[AD-785206] N75-12460
Calculation of the absorption of X-ray radiation in the earth's atmosphere
[AD-785110] N75-12478
Aerostatic measurements of the vertical distribution of the atmospheric aerosol
[AD-785114] N75-12479
Problem of analytical solution of equations of dynamics for the model of an equivalent barotropic level of the atmosphere
[AD-785106] N75-12533
Vibration disease and its pathogenesis
[AD-785202] N75-12584
Possibilities for the construction of various types of multi-value adders from mixers, switches, and spectrotrons
[AD-781323/1] N75-12626
Stratification phenomena in the positive column of a low pressure oxygen discharge
[AD-783054] N75-12803
Plasma accelerators
[AD-785108] N75-12806
Dynamic of the current sheath in a pulsed coaxial injector
[AD-785115] N75-12809
Excitation of plane thermoelastic waves in a layer with a finite rate of heat propagation
[AD-785190] N75-12820

AIRESEARCH MFG. CO., PHOENIX, ARIZ.
Small turbine engine noise reduction. Volume 5: Data tabulations
[AD-780576/5] N75-11988

ALABAMA UNIV., HUNTSVILLE.
Determination of points of entry for potential contaminants into limestone aquifers using thermal infrared imagery
[NASA-CR-120540] N75-12546

AMERICAN GAS ASSOCIATION, INC., ARLINGTON, VA.
A survey of LNG technological needs in the USA: 1974 to beyond 2000
N75-12435

AMES LAB., IOWA.
Algorithms for projection methods for solving linear systems of equations
[IS-3397] N75-12684

APPLIED SCIENCE ASSOCIATES, INC., DENVER, COLO.
Computer generated troubleshooting trees: The program
[AD-785139] N75-12350

ARGONNE NATIONAL LAB., ILL.
High-temperature thermodynamic properties of sodium
[ANL-8095] N75-12102
Thermal ratcheting of a beam
[ANL-CT-74-16] N75-12371
Analytical modeling of thermal discharges. A review of the state of the art
[ANL/ES-18] N75-12456
Field investigations of heated discharges from nuclear power plants on Lake Michigan, 1972
[ANL/ES-32] N75-12457
Dispersion simulation techniques for assessing the air pollution impacts of ground transportation systems
[ANL/ES-29] N75-12458
Short description of the thermonuclear facilities of the I. V. Kurchatov Institute for Nuclear Energy
[ANL-TRANS-952] N75-12722

ARIZONA UNIV., TUCSON.
Reconstruction of past climatic variability
[AD-785395] N75-12536

SOURCE

The 100 micron surveys in the Northern and Southern Hemispheres
N75-12737
A balloon-borne 1 meter telescope for far-infrared astronomy
N75-12740
Low-background air-infrared telescope for balloon-borne infrared astronomy
N75-12749
Stabilization, pointing and command control of a balloon-borne 1-meter telescope
N75-12756

ARMY AIR MOBILITY RESEARCH AND DEVELOPMENT LAB., HAMPTON, VA.
Surface recrystallization theory of the wear of copper in liquid methane
[NASA-TN-D-7840] N75-12124

ARMY ARMAMENT COMMAND, ROCK ISLAND, ILL.
Analysis of delivery accuracy for AH-1G [Cobra] launched 2.75-inch rockets from tests conducted January - March 1972 at China Lake, California
[AD-782978] N75-12891

ARMY AVIATION SYSTEMS COMMAND, ST. LOUIS, MO.
Major Item Special Study [MISS], CH-54A rotary wing blade
[AD-785554] N75-11906

ARMY AVIATION SYSTEMS TEST ACTIVITY, EDWARDS AFB, CALIF.
Engineering flight test, AH-1G helicopter, heavyweight autorotational evaluation
[AD-785553] N75-11964

ARMY ELECTRONICS COMMAND, FORT MONMOUTH, N.J.
The deposition of Er-Eu-Ga-F c0e garnet single crystal films
[AD-785511] N75-12111
Transverse propagation constants in dielectric waveguides
[AD-785512] N75-12712

ARMY FOREIGN SCIENCE AND TECHNOLOGY CENTER, CHARLOTTESVILLE, VA.
Leveling of elevations in blocks compiled from flight-line nets in phototriangulation
[AD-783830] N75-12426

ARMY MATERIAL COMMAND, TEXARKANA, TEX.
Use of cholesteric liquid crystals for locating voids in adhesively bonded helicopter rotor blades
[AD-785502] N75-11963
Sample size determination for estimating parameters of the exponential distribution
[AD-785503] N75-12351
Methods for the determination of the probability distribution and/or the parameters which best describe a set of test data
[AD-785497] N75-12691

ARMY MATERIALS AND MECHANICS RESEARCH CENTER, WATERTOWN, MASS.
Thermal and acoustic fatique of ceramics and their evaluation
[AD-785547] N75-12152

ARMY MATERIEL COMMAND, ALEXANDRIA, VA.
Engineering design handbook: Helicopter performance testing
[AD-785000] N75-11965
Engineering design handbook: Environmental series. Part one: Basic environmental concepts
[AD-784999] N75-12461

ARMY MOBILITY EQUIPMENT RESEARCH AND DEVELOPMENT CENTER, FORT BELVOIR, VA.
Type 2 film superconductors for power applications
[AD-785534] N75-12220

ARMY NATICK LABS., MASS.
Non-caking freeze dried applesauce
[NASA-CR-140938] N75-12621

ARMY WAR COLL., CARLISLE BARRACKS, PA.
Oil for the free world in the 1970's
[AD-779352] N75-12448

ARO, INC., ARNOLD AIR FORCE STATION, TENN.
Experimental magnus characteristics of several ballistic projectiles with various boattail angles and lengths at Mach numbers 1.5, 2.0, and 1.5
[AD-785346] N75-11908
Application of linearized transonic theory to tunnel blockage interference
[AD-785349] N75-12008
Formation of mixed molecular clusters in free-jet expansions
[AD-785347] N75-12112
Cluster intensity and velocity measurements in condensed flows
[AD-785348] N75-12264
Application of a dual beam laser velocimeter to turbulent flow measurements
[AD-785352] N75-12324

ARTEC ASSOCIATES, INC., HAYWARD, CALIF.
Feasibility of explosively driven hypervelocity projectiles
[AD-784271] N75-11907

ASSOCIATION AERONAUTIQUE ET ASTRONAUTIQUE DE FRANCE, PARIS.
Subcritical and supercritical compressible flows without shock in vane meshes
[AAAF-NT-74-1] N75-12225
King's law coefficients computation method for linearization of the constant temperature anemometer
[AAAF-NT-74-2] N75-12274

ATLANTIC RICHFIELD HANFORD CO., RICHLAND, WASH.
Guide of fire protection in caves, canyons, and hot cells
[ARH-3020] N75-12163

ATOMIC ENERGY COMMISSION, WASHINGTON, D.C.
DCTR power supply and energy storage review meeting
[WASH-1310] N75-12445
Nuclear power growth, 1974 - 2000
[WASH-1139-74] N75-12723
Compilation of occupational radiation exposure from light water cooled nuclear power plants, 1969 - 1973
[WASH-1311] N75-12724
Fusion power by magnetic confinement
[WASH-1290] N75-12797

ATOMIC ENERGY ESTABLISHMENT, CAIRO [EGYPT].
Power supply for Helmholtz coils
[AREAEE-177] N75-12212

AUBURN UNIV., ALA.
Analysis of an impulse noise suppressor for FM demodulators
[NASA-CR-120492] N75-12198

AVCO GOVERNMENT PRODUCTS GROUP, LOWELL, MASS.
High power ac/dc variable R dynamic electrical load simulator
[NASA-CR-140331] N75-12199

AVCON UNIVERSAL CONSULTANTS CORP., BADEN, PA.
Development of microwave landing system implementation criteria
[AD-785220] N75-12005

B

BALL BROS. RESEARCH CORP., BOULDER, COLO.
Balloon platform for extended-life astronomy research
N75-12748
Balloon infrared astronomy platform [BIRAP]
N75-12759

BALLISTIC RESEARCH LABS., ABERDEEN PROVING GROUND, MD.
An improved projectile boattail
[AD-785520] N75-11900
Similarity solutions of the boundary layer equations for flow over a moving wall
[AD-781496/5] N75-12259
Additional two-dimensional wake and jet-like flows
[AD-785522] N75-12262

BARCELONA UNIV. [SPAIN].
Nucleosynthesis of light elements in stellar atmospheres and in interstellar matter
N75-12868

BATTELLE COLUMBUS LABS., OHIO.
Characterization of exothermic brazing components Skylab experiment M552
[NASA-CR-120518] N75-12015

BATTELLE-NORTHWEST, RICHLAND, WASH.
Research in the production of rare-earth-cobalt permanent magnet material by sputter deposition
[AD-785358] N75-12166
Determination of total body calcium [skeletal mass] in man by in vivo neutron activation analysis and total body counting
[TID-26613] N75-12581

BECKMAN INSTRUMENTS, INC., FULLERTON, CALIF.
Oxygen concentration sensor for aircraft fuel tanks
[AD-785144] N75-11967

BELL AEROSPACE CO., BUFFALO, N.Y.
Nondestructive tests of regenerative chambers
[NASA-CR-134656] N75-12058
Nondestructive tests of regenerative chambers, appendix
[NASA-CR-134657] N75-12059

BELL AEROSYSTEMS CO., BUFFALO, N.Y.
A discretized program for the optimal design of complex structures
N75-12362

BENDIX CORP., KANSAS CITY, MO.
Automated testing in a high noise environment
[BDX-613-1138] N75-12348

BODENSEEWERK GERAETETECHNIK G.M.B.H., UEBERLINGEN [WEST GERMANY].
Aspects of guidance and control for steep and curved approaches of STOL aircraft
N75-11945

BOEING AEROSPACE CO., SEATTLE, WASH.
Flight control and procedures for stimulated visual approach and landing. Self-paced training package
[NASA-CR-140335] N75-11999

BOEING CO., KENT, WASH.
Quantitative determination of stratospheric aerosol characteristics
[E75-10010] N75-12393

BOEING CO., WICHITA, KANS.
Acoustic attenuation design requirements established through EPNL parametric trades
[NASA-CR-120986] N75-11985

BOEING COMMERCIAL AIRPLANE CO., SEATTLE, WASH.
A 727/JT8D-100 series engine exhaust system propulsion performance model test
[NASA-CR-134617] N75-11984

BOLT, BERANEK, AND NEWMAN, INC., CAMBRIDGE, MASS.
Interface message processors for the ARPA computer network
[AD-784951] N75-12665
Natural communication with Computers 4
[AD-784231] N75-12667

BOLT, BERANEK, AND NEWMAN, INC., CANOGA PARK, CALIF.
Community noise exposure resulting from aircraft operations: Computer program operation's manual
[AD-785360] N75-11989

BRANDEIS UNIV., WALTHAM, MASS.
Molecular basis for the mutagenic and lethal effects of ultraviolet irradiation
[COO-3232-3] N75-12548
Effect of light on respiration and development of photosynthetic cells
[COO-3231-2] N75-12549

BRITISH BROADCASTING CORP., KINGSWOOD [ENGLAND].
UHF television: Requirements for long-term and short-period carrier drive frequency stability
[BBC-RD-1974/33] N75-12167
Colour television displays: Error diagrams for evaluating the reproduced chromaticities of some test colours
[BBC-RD-1974/34] N75-12733

BROOKHAVEN NATIONAL LAB., UPTON, N.Y.
Metal hydrides as hydrogen storage media
[BNL-18887] N75-12440
Iron titanium hydride as a source of hydrogen fuel for stationary and automotive applications
[BNL-18651] N75-12441
Survey of applications of fusion power technology to the chemical and material processing industry
[BNL-18866] N75-12443

BROWN UNIV., PROVIDENCE, R.I.
Heuristic-adaptive search for regimes in a string of data
[AD-784473] N75-12650

BUDD CO., FORT WASHINGTON, PA.
Design and mockup evaluation of a high-strength armored crew seat for transport/cargo aircraft
[AD-785145] N75-11956

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS, CANBERRA [AUSTRALIA].
A study of the usefulness of Skylab EREP data for earth resources studies in Australia
[E75-10047] N75-12415

BUREAU OF RECLAMATION, DENVER, COLO.
Project Skywater
[REC-ERC-73-17] N75-12487

C

CAI, BARRINGTON, ILL.
Sample test reports for camera, still picture, KA-91B
[AD-785399] N75-12294

CALIFORNIA INST. OF TECH., PASADENA.
The generation of gravitational waves. 1. Weak-field sources: A plug-in-and-grind formalism
[NASA-CR-140864] N75-12872

CALIFORNIA UNIV., BERKELEY.
Tough cryogenic alloys from the Fe-Mn and Fe-Mn-Cr systems
[NASA-CR-134688] N75-12120
Individual differences in an organizational setting: Interrelationships and influences
[AD-785003] N75-12615
AC electronic tunneling at optical frequencies
[NASA-CR-140802] N75-12812
Empirical findings and suggestions for future research on organizational communication
[AD-785002] N75-12843
Microwave and infrared observations of molecular spectra in Comet Kohoutek
[NASA-CR-140955] N75-12865
Lunar particle shadows and boundary layer experiment: Plasma and energetic particles on the Apollo 15 and 16 subsatellites
[NASA-CR-140371] N75-12871

CALIFORNIA UNIV., BERKELEY. LAWRENCE BERKELEY LAB.
Annealing of stacking-fault tetrahedra and frank dislocation loops in silver
[LBL-1172] N75-12132
Structure and mechanical properties of Cu-Mn-Al alloy
[LBL-2598] N75-12133
Lamp code users guide
[UCID-16525] N75-12310

Barely intelligent terminal
[LBL-2676] N75-12661
High resolution imaging in bright and dark field at high voltages
[LBL-2712] N75-12765
Non-conventional electron microscopy in small defect characterization
[LBL-2585] N75-12766
Self-focusing and optical-field-induced effects in liquids and liquid crystals
[LBL-2592] N75-12767

CALIFORNIA UNIV., LIVERMORE. LAWRENCE LIVERMORE LAB.
Second and third order difference techniques for two-dimensional hyperbolic systems of conservation laws, with an application to transonic flow about an airfoil
[UCRL-51529] N75-12251
Two-dimensional calculations of high density laser induced fusion: Study of symmetry and Taylor instability
[UCRL-74926] N75-12302
Laser systems for laser fusion
[UCRL-75367] N75-12303
Characterization of self-focusing mechanisms in laser materials
[UCRL-13597] N75-12308
Prospects for laser fusion
[UCRL-75691] N75-12309
Design of a secure data transmission system: An implementation of communication theory using a microcomputer
[UCRL-51587] N75-12625
Interactive digital image processing and display system
[UCRL-75655] N75-12646
Introduction to RATS [RISOS/ARPA Terminal System]: An operating system for the DEC PDP-11/45
[UCRL-51582] N75-12662
Space charge limiting of bounded relativistic electron beams
[UCID-16527] N75-12725
Particle registration in dielectric materials: A bibliography
[UCRL-51568] N75-12726

CALIFORNIA UNIV., LOS ANGELES.
Multilevel model for the synthesis of reliable programs
[UCLA-10-P-14-126] N75-12347
Some approximation concepts for structural synthesis
[NASA-CR-140937] N75-12359
Experiment with methodologies for the specification of programming systems
[UCLA-10-P-14-128] N75-12643
Time-optimal control synthesis for non-linear systems: A flight dynamic example
[AD-785405] N75-12671

CALIFORNIA UNIV., RIVERSIDE.
Transport optical and magnetic properties of solids
[AD-785429] N75-12710

CALSPAN CORP., BUFFALO, N.Y.
Infrared radiation from H2O, CO2 or NH3 collisionally excited by N2, O or Ar
[AD-785412] N75-12827

CASE WESTERN RESERVE UNIV., CLEVELAND, OHIO.
Differential capacitance study on the edge orientation of pyrolytic graphite and glassy carbon electrodes
[AD-785263] N75-12083
Disturbances in a wall boundary layer introduced by an array of low-intensity vortices
[AD-785394] N75-12268
Intermediate state in superconductors
[AD-785484] N75-12825

CATALYST RESEARCH CORP., BALTIMORE, MD.
Multishot thermal battery
[AD-785584] N75-12450

CATHOLIC UNIV. OF AMERICA, WASHINGTON, D.C.
Experimental determination of countercurrent two-phase flow of water
[ORO-4348-1] N75-12731

CBS LABS., STAMFORD, CONN.
Holo-scanner technique for wideband recording
[AD-785396] N75-12293

CENTRAL ELECTRICITY GENERATING BOARD, BERKELEY [ENGLAND].
Fatigue crack propagation due to random amplitude vibrations: Prediction using constant amplitude data
[RD/B/N-2784] N75-12368

CHRYSLER CORP., NEW ORLEANS, LA.
Transonic and supersonic wind tunnel test of the action hypervelocity test missile. Volume 1: Stability characteristics
[AD-785565] N75-11904
Transonic and supersonic wind tunnel test of the action hypervelocity test missile. Volume 2: Drag characteristics
[AD-785566] N75-11905
Reentry aerodynamic characteristics of a space shuttle solid rocket booster model 449 tested in MSFC 14 by 14 inch TWT [SA26F]
[NASA-CR-134435] N75-12022
Aerodynamic results of wind tunnel separation tests on a 0.01-scale model [32-OTS] space shuttle integrated vehicle in the AEDC-VKF-SWTA [IA57]
[NASA-CR-134401] N75-12029
Space shuttle launch vehicle [13 P-OTS] strut support interference effects study in the Rockwell International 7- by 7-foot trisonic wind tunnel [IA68]
[NASA-CR-134427] N75-12030
Results of investigations on an 0.015-scale 140A/B configuration of the Rockwell International space shuttle orbiter [model 49-O] in the NASA/Ames Research Center 3.5-foot hypersonic wind tunnel [OA36]
[NASA-CR-134430] N75-12031
A hypersonic force and moment test of a 0.006 scale model [466] of the 330.2 inch diameter external tank in the Ames Research Center 3.5 foot hypersonic wind tunnel [TA9F]
[NASA-CR-134425] N75-12032
Results of an experimental aerodynamic investigation to obtain static stability and control characteristics of the SSV configurations: The 2A[VL70-000089B] model 1 and 3[VL70-000139B] model 2 orbiter at Mach numbers of 2.5, 3.9 and 4.6 in the NASA LaRC 4 X 4-foot UPWT [OA44]
[NASA-CR-134411] N75-12033
Effects of air breathing engine plumes on SSV orbiter subsonic wing pressure distribution [OA57B], volume 1
[NASA-CR-134416] N75-12034
Effects of wing/elevon gap sealing flapper doors on orbiter elevon effectiveness of model 16-0 in the NAAL 7.75 by 11 foot continuous flow wind tunnel [OA119A]
[NASA-CR-134421] N75-12035
Effects of the air breathing engine plumes on SSV orbiter subsonic wing pressure distributions [OA57A]
[NASA-CR-134414] N75-12040
Development of a battery status monitor
[NASA-CR-140362] N75-12278

CINCINNATI UNIV., OHIO.
A numerical method for the solution of particulate flow equations
[REPT-74-42] N75-12227
Numerical solutions to the full viscous shock layer equations using an alternating direction implicit technique
[AD-785242] N75-12256

CITY UNIV. OF NEW YORK.
Structure dependent properties of thin film superconductors
[AD-785424] N75-12822

CIVIL AEROMEDICAL INST., OKLAHOMA CITY, OKLA.
Reception of distorted speech
[AD-777564] N75-12178

CLEMSON UNIV., S.C.
Mathematical modeling of Donnan dialysis; a continuous ion exchange membrane process
[SRO-810-1] N75-12547

COLORADO SCHOOL OF MINES, GOLDEN.
Index of Skylab data available at Colorado School of Mines
[E75-10041] N75-12410
Geologic and mineral and water resources investigations in Western Colorado, using Skylab EREP data
[E75-10043] N75-12412

COLORADO STATE UNIV., FORT COLLINS.
An assessment of warm fog: Nucleation, control, and recommended research
[NASA-CR-2477] N75-12529
Electrical conduction through thermal and anodic oxides of indium antimonide
[AD-785078] N75-12819

COLT INDUSTRIES, INC., WEST HARTFORD, CONN.
Turbine engine fuel control reliability test and evaluation
[AD-785580] N75-11994

COLUMBIA UNIV., NEW YORK.
Investigation of convective arcs for the simulation of reentry aerodynamic heating
[AD-785388] N75-12021
Dual trees and resummation theorems
[COO-2271-28] N75-12693
Value of fundamental constants
[COO-2271-34] N75-12828

COMMISSARIAT A L'ENERGIE ATOMIQUE, BRUYERES-LE-CHATEL [FRANCE].
Study of phase transformations in titanium alloy. 3: Study of isothermal transformations of Beta 3 titanium alloy
[CEA-R-4567] N75-12130
Phase transformations in titanium alloys. 1. Contribution to study of transformation kinetics in Ti-6 percent Al-6 percent V-2 percent Sn alloy
[CEA-R-4542] N75-12131

COMMISSARIAT A L'ENERGIE ATOMIQUE, FONTENAY-AUX-ROSES [FRANCE].
Preparation of substoichiometer titanium carbides and mixed titanium-tantalum carbides
[CEA-N-1684] N75-12079
Study of multiple time series by data analysis
[CEA-R-4561] N75-12679
Possibility of heating TFR plasmas by the absorption of fast magnetohydrodynamic waves
[EUR-CEA-FC-711] N75-12793

COMMISSARIAT A L'ENERGIE ATOMIQUE, GRENOBLE [FRANCE].
Study of molecular dynamics in nematic and isotropic phases of liquid crystals
[CEA-R-4492] N75-12099
Signal processing
[CEA-CONF-2584] N75-12180
Application of stable nitroxide free radicals in solution to low magnetic field measurements
[CEA-R-4540] N75-12707

COMMISSARIAT A L'ENERGIE ATOMIQUE, MONTROUGE [FRANCE].
Application of the least square method to magnetic resonance techniques
[CEA-R-4511] N75-12346

COMMISSARIAT A L'ENERGIE ATOMIQUE, SACLAY [FRANCE].
Technical problems encountered in the study of a dirigible freighter
[CEA-CONF-2580] N75-11899

COMMISSION OF THE EUROPEAN COMMUNITIES, ISPRA [ITALY].
Determination of mercury by controlled potential coulometry: An outlay for automatic performance
[EUR-5125] N75-12103

COMMITTEE ON PUBLIC WORKS [U. S. SENATE].
Automobile emission standards
[S-REPT-93-598] N75-12452

COMMITTEE ON SCIENCE AND ASTRONAUTICS [U. S. HOUSE].
Aircraft noise abatement
[GPO-41-298] N75-11969
Earth resources survey system
[GPO-41-665] N75-12416
Solar sea thermal energy
[GPO-37-476] N75-12430
Energy and environmental standards
[GPO-37-171] N75-12431

COMMUNICATIONS RESEARCH CENTRE, OTTAWA [ONTARIO].
The effect of protocol on the response time of loop structures for data communications
[CRC-1261] N75-12174
Thin-walled beam theory generalized to include thermal effects and arbitrary twist angle
[CRC-1253] N75-12363
Proceedings of the Canadian Workshop on acoustic surface waves
[CRC-1260] N75-12696
Introduction to the proceedings of the Canadian workshop on acoustic surface waves
N75-12697
Systems applications and implementation 1: Communications
N75-12700
Systems applications and implementation 2: Radar
N75-12701

CONNECTICUT UNIV., WATERBURY.
Investigation of solidification in zero-gravity environment: M553 sphere forming experiment. Nickel-silver alloy evaluation
[NASA-CR-129034] N75-12017

CONTROL DATA CORP., MINNEAPOLIS, MINN.
Correlation and registration of ERTS multispectral imagery
[NASA-CR-134294] N75-12420

CORNELL UNIV., ITHACA, N.Y.
A high resolution electron microscope study of the omega transformation in Zr-N 0b alloys
[AD-785267] N75-12137
Shear buckling of square perforated plates
[NASA-CR-132548] N75-12364
Evaluation of Skylab imagery as an information service for investigating land use and natural resources
[E75-10018] N75-12397
Far infrared absorption in small metallic particles
[COO-3151-38] N75-12708

CORNELL UNIV., NEW YORK.
A cooled telescope for infrared balloon astronomy
N75-12744

COUNCIL ON ENVIRONMENTAL QUALITY, WASHINGTON, D.C.
Energy and the environment: Electric power
N75-12438

CURTISS-WRIGHT CORP., WOOD-RIDGE, N.J.
Design and development testing of free planet transmission concept
[AD-782857/7] N75-12338

D

DANISH ATOMIC ENERGY COMMISSION, RISOE.
Investigations of plasma dielectric functions
[RISO-301] N75-12796

DANISH METEOROLOGICAL INST., COPENHAGEN.
Oceanographical observations from Danish light-vessels and coastal stations, 1973
[ISBN-87-7478-097-2] N75-12539

DAYTON UNIV., OHIO.
An arc imaging furnace for the characterization of thermally protective materials
[AD-785586] N75-12055
DCW INDUSTRIES, SHERMAN OAKS, CALIF.
Numerical study of separated turbulent flows
N75-12226
DEFENCE AND CIVIL INST. OF ENVIRONMENTAL MEDICINE, DOWNSVIEW [ONTARIO].
Aircrew workload and human performance: The problem facing the operational commander
N75-12595
DEFENCE RESEARCH ESTABLISHMENT OTTAWA [ONTARIO].
An examination of whiteouts and transmission through ice fog in the visible and near infrared
[DREO-TN-74-18] N75-12467
DEFENCE RESEARCH ESTABLISHMENT VALCARTIER [QUEBEC].
Measure of the characteristics of TEA CO2 amplifier and experimental study of the propagation of a laser pulse with an exponential front in the amplifying media and absorption at 10.6 microns
[DREV-R-710/74] N75-12301
DEFENCE STANDARDS LABS., MARIBYRNONG [AUSTRALIA].
Stimulated chemiluminescence in the alkalihalides
[TN-336] N75-12091
Interferometric study of some organotin polymers
[DSL-TN-388] N75-12092
The semimicro determination of potassium chlorate and lead thiocyanate in priming compositions
[DSL-TN-339] N75-12093
A wavelength sorting method for electron probe X-ray microanalysis
[DSL-600] N75-12097
Chromate passivation of brass
[TN-341] N75-12122
The painting of military aircraft
[DSL-TN-345] N75-12147
Kamlets technique for predicting detonation velocity and pressure
[REPT-594] N75-12153
Fabrication and performance assessment of shaped charges
[DSL-546] N75-12155
Calibration of the DSL 50 ton-force [500 kN] single-lever primary standard of force
[DSL-551] N75-12331
A method for measuring small transmittances and reflectances with the Cary 14R spectrophotometer-spectroradiometer
[DSL-TN-334] N75-12764
DEFENSE DOCUMENTATION CENTER, ALEXANDRIA, VA.
Personnel management
[AD-785350] N75-12846
Bibliography of bibliographies in the DDC collection
[AD-780700/1] N75-12851
DELAWARE STATE PLANNING OFFICE, DOVER.
Definition of heavy industry, guidelines for acceptable manufacturing uses, and plan for manufacturing gases in Delaware's coastal zone
N75-12855
Public land use controls in Delaware's coastal zone
N75-12856
DELAWARE UNIV., NEWARK.
Analysis and design of composite bonded joints under a dynamic type load
[AD-785433] N75-12375
DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, STUTTGART [WEST GERMANY].
Is MHD dead?
N75-12780
Principles of an axisymmetric MPD-accelerator with external magnetic field
N75-12785
The Pitot pressure in magnetogasdynamic flows
N75-12787
Fast expanding carbon plasma jets as laser-active medium?
N75-12789
Aspects of plasmadynamic lasers: High outputs at short wavelengths
N75-12790
DEUTSCHE GESELLSCHAFT FUER LUFT- UND RAUMFAHRT, COLOGNE [WEST GERMANY].
New or newly tested methods for the assessment of pilots' workload
[DLR-MITT-74-19] N75-12605
Error control in estimation of pilot stress by measuring skin resistance
N75-12610
Magnetofluiddynamics
[DLR-MITT-74-20] N75-12779
DIRECTION DE LA METEOROLOGIE NATIONALE, PARIS [FRANCE].
Evapotranspiration: Agrometeorological aspect and evaluation of potential evapotranspiration
[MONO-65] N75-12482
General physical characteristics of mists
[MONO-92] N75-12483
Climatological elements of the coasts of Metropolitan France [Atlantic]
[MONO-93-VOL-2] N75-12484
Climatological elements of the coasts of Metropolitan France [North Sea, Channel]
[MONO-93-VOL-1] N75-12485
Climatological elements of the coasts of Metropolitan France [Mediterranean]
[MONO-93-VOL-3] N75-12486
DOUGLAS AIRCRAFT CO., INC., LONG BEACH, CALIF.
Parametric study of STOL short-haul engine cycles and operational techniques to minimize community noise impact
[NASA-CR-2486] N75-11910
The Mark 4 supersonic-hypersonic arbitrary body program. Volume 1: User's manual
[AD-778443] N75-12056
The Mark 4 supersonic-hypersonic arbitrary body program. Volume 3: Program listings
[AD-778445] N75-12057
DU PONT AEROSPACE CO., INC., TORRANCE, CALIF.
Engines for commercial STOL transports
N75-11947
DUGWAY PROVING GROUND, UTAH.
Fog and wind regimes of the Eureka-Arcata coastal region of northern California
[AD-785531] N75-12534
DUNLAP AND ASSOCIATES, INC., LA JOLLA, CALIF.
Pilot landing performance under high workload conditions
N75-12594
Prediction of pilot performance: Biochemical and sleep-mood correlates under high workload conditions
N75-12599

E

ECON, INC., PRINCETON, N.J.
The value of improved [ERS] information based on domestic distribution effects of U.S. agriculture crops
[NASA-CR-141046] N75-12423
Improved [ERTS] information and its impact on U.S. markets for agricultural commodities: A quantitative economic investigation of production, distribution and net export effects
[NASA-CR-141044] N75-12424
The role of ERTS in the establishment and of a nationwide land cover information system
[NASA-CR-141045] N75-12425
ELECTROMAGNETIC SYSTEMS LABS., SUNNYVALE, CALIF.
Image selection system
[NASA-CR-2475] N75-12422
ENERGY RESEARCH CORP., BETHEL, CONN.
Electrolyte for hydrocarbon air fuel cells
[AD-784236] N75-12451
ENGINEERING SCIENCES DATA UNIT, LONDON [ENGLAND].
One-dimensional compressible gas flow in ducts
[ESDU-74028] N75-12223
Buckling stress coefficients for thin-walled unstiffened circular cylinders under combined axial compression and internal pressure
[ESDU-04.01.01-AMEND-A] N75-12352
The stability and response of linear systems. Part 2: Methods of displaying stability characteristics
[ESDU-74020-PT-2] N75-12673
ENVIRONMENTAL PREDICTION RESEARCH FACILITY [NAVY], MONTEREY, CALIF.
Computation of real-time currents off Southern California with multi-layer hydrodynamical-numerical models
[AD-785245] N75-12541
ENVIRONMENTAL RESEARCH AND TECHNOLOGY, INC., LEXINGTON, MASS.
Experimental evaluation of atmospheric effects on radiometric measurements using the EREP of Skylab
[E75-10036] N75-12406
ENVIRONMENTAL RESEARCH INST. OF MICHIGAN, ANN ARBOR.
SAR image quality analysis model, volume 2
[AD-785398] N75-12187
Rotational relaxation measurements and resonant phenomena in laser-excited hydrogen fluoride
[AD-784952] N75-12321
Study of atmospheric effects in Skylab data
[E75-10006] N75-12391
Mapping exposed silicate rock types and exposed ferric and ferrous compounds from a space platform
[E75-10008] N75-12392
Study of recreational land and open space using Skylab imagery
[E75-10020] N75-12399
Study of recreational land and open space using Skylab imagery
[E75-10034] N75-12404
A Skylab program for the International Hydrological Decade [IHD]
[E75-10039] N75-12408
Developing processing techniques for Skylab data
[E75-10040] N75-12409
New theoretical models and ratio imaging techniques associated with the NASA earth resources spectral information system
[NASA-CR-140357] N75-12417
ENVIRONMENTAL TECHNICAL APPLICATIONS CENTER [AIR FORCE], WASHINGTON, D.C.
Atmospheric moisture parameterization
[AD-784814] N75-12476
EPSILON LABS., BEDFORD, MASS.
Balloon-borne aerosol counter modifications, particle sizing accuracy tests
[AD-784866] N75-12475
ESL, INC., SUNNYVALE, CALIF.
Earth resources sensor data handling system: NASA JSC version
[NASA-CR-140334] N75-12418
ESSEX CORP., ALEXANDRIA, VA.
Study of roles of remote manipulator systems and EVA for shuttle mission support, volume 1
[NASA-CR-140364] N75-12036
EXPLOSIVE TECHNOLOGY, INC., FAIRFIELD, CALIF.
An emergency life saving instant exit system for cargo, cargo-transport and passenger aircraft, volume 2
[AD-778824] N75-11966

F

FABRIC RESEARCH LABS., INC., DEDHAM, MASS.
Development of stretch fabric for parachute canopies
[AD-785195] N75-11902
FEDERAL ENERGY ADMINISTRATION, WASHINGTON, D.C.
Project Independence: A summary
N75-12427
Project Independence
N75-12428
FORSVARETS TELETEKNISKA LAB., STOCKHOLM [SWEDEN].
A look at the future of electronic components
[FTL-A-A28:1] N75-12210
A computerized system for reliability predictions: RRP-1. Part 1: Introduction
[FTL-A-A16:23-PT-1] N75-12344
FRANKLIN INST. RESEARCH LABS., PHILADELPHIA, PA.
Thin film research and development
[AD-779389] N75-12339
FRAUNHOFER-GESELLSCHAFT, GARMISCH-PARTENKIRCHEN [WEST GERMANY].
Boundary layer aerosol transport measurements in a valley system
[AD-781010/4] N75-12477

G

GENERAL DYNAMICS/CONVAIR, SAN DIEGO, CALIF.
Interactive computer-aided design aircraft flying qualities program. Volume 1: Users manual
[AD-785101] N75-11957
Interactive computer-aided design aircraft flying qualities program. Volume 2: Methods formulation manual
[AD-785102] N75-11958
Interactive computer-aided design aircraft flying qualities program. Volume 3: Computer programming manual
[AD-785103] N75-11959
Interactive computer-aided design aircraft flying qualities program. Volume 4: Program assessment/correlation report
[AD-785104] N75-11960
GENERAL DYNAMICS/FORT WORTH, TEX.
Filamentary composite laminates subjected to biaxial stress fields
[AD-785362] N75-12081
GENERAL ELECTRIC CO., CINCINNATI, OHIO.
Cascade tests of serrated leading edge blading at high subsonic speeds
[NASA-CR-2472] N75-11983
GENERAL ELECTRIC CO., HOUSTON, TEX.
Qualification test report bump protection hat [subassembly of T020/M509 head protective assembly]
[NASA-CR-140347] N75-12618
GENERAL MOTORS CORP., INDIANAPOLIS, IND.
Exploratory investigation for reducing labyrinth seal leakage in high pressure ratio gas turbines
[AD-781005/4] N75-12341
GENEVA OBSERVATORY [SWITZERLAND].
The stellar and solar tracking system of the Geneva Observatory gondola
N75-12753
GEOLOGICAL SURVEY, BAY SAINT LOUIS, MISS.
Hydrologic significance of lineaments in central Tennessee
[E75-10030] N75-12401

GEOLOGICAL SURVEY, DENVER, COLO.
Remote sensing geophysics from Skylab
[E75-10045] N75-12413
GEOLOGICAL SURVEY, RESTON, VA.
Urban and regional land use analysis: CARETS and census cities experiment package
[E75-10019] N75-12398
GEORGIA INST. OF TECH., ATLANTA.
Combustion generated noise in turbopropulsion systems
[AD-785485] N75-11990
Adaptive differential PCM speech transmission
[AD-785124] N75-12191
GOSUDARSTVENNYI KOMITET PO ISPOLZOVANIYU ATOMNOI ENERGII, MOSCOW [USSR].
Short description of the thermonuclear facilities of the I. V. Kurchatov Institute for Nuclear Energy
[ANL-TRANS-952] N75-12722
GRAMBLING STATE UNIV., LA.
A proposal to study polarizations for hydromagnetic waves observed at ATS-1
[NASA-CR-140857] N75-12464
GRONINGEN RIJKSUNIVERSITEIT [NETHERLANDS].
Multicolour far infrared photometry of galactic H2 regions
N75-12741
GRUMMAN AEROSPACE CORP., BETHPAGE, N.Y.
A three dimensional variable node isoparametric solid element
[AD-785353] N75-12377
GRUMMAN AIRCRAFT ENGINEERING CORP., BETHPAGE, N.Y.
Effects of microstructural modification on titanium toughness and fatigue
[AD-785409] N75-12139
GULF NUCLEAR FUELS CO., ELMSFORD, N.Y.
Direct method based projections for solving systems of linear equations
[IS-3396] N75-12680
GUYOL [NATHANIEL B.], SAN RAFAEL, CALIF.
The approaching energy crisis: A call for action
N75-12432

H

HAMILTON STANDARD, WINDSOR LOCKS, CONN.
Multiple fault gas path analysis applied to TF30-P-408 engine data
[AD-785265] N75-11996
HARRY DIAMOND LABS., WASHINGTON, D.C.
Fiber optic seals: Improved seal assemblies and inspection equipment for field use in international safeguards and arms control applications
[AD-785540] N75-12342
HARVARD COLL. OBSERVATORY, CAMBRIDGE, MASS.
Stabilization, pointing and command control of a balloon-borne 1-meter telescope
N75-12756
HARVARD UNIV., CAMBRIDGE, MASS.
Analysis of crossed wires in a plane-wave field
[AD-784972] N75-12219
HAWKER SIDDELEY AVIATION, LTD., HATFIELD [ENGLAND].
Atmospheric attenuation of aircraft noise. Experimental valves measured in a range of climatic conditions, volume 1
[HSA-HAD-R-GEN-214-VOL-1] N75-11979
Atmospheric attenuation of aircraft noise. Experimental valves measured in a range of climatic conditions, volume 2
[HSA-HAD-R-GEN-214-VOL-2] N75-11980
HONEYWELL, INC., OKLAHOMA CITY, OKLA.
Transient and steady-state velocity of domain walls for a complete range of drive fields
[NASA-CR-140942] N75-12694
HOUSTON UNIV., TEX.
A study of the operation of selected national research facilities
[NASA-CR-140322] N75-12842
HUDSON INST., INC., CROTON-ON-HUDSON, N.Y.
Energy and security: Implications for American policy
[AD-785084] N75-12857
HUGHES AIRCRAFT CO., CULVER CITY, CALIF.
Development for application of parylene coatings
[NASA-CR-120536] N75-12208
HUGHES AIRCRAFT CO., EL SEGUNDO, CALIF.
Stellar tracking attitude reference system
[NASA-CR-139158] N75-12026
HUGHES RESEARCH LABS., MALIBU, CALIF.
Frequency tuned CO2 laser
[AD-785180] N75-12317

I

IIT RESEARCH INST., CHICAGO, ILL.
Filamentary composite laminates subjected to biaxial stress fields
[AD-785362] N75-12081
ILLINOIS INST. OF TECH., CHICAGO.
On the interpretation of the output of hot-film anemometers and a scheme of dynamic compensation for water temperature variation
[AD-784912] N75-12295
ILLINOIS UNIV., CHICAGO.
Time series model for texture synthesis
[TID-26599] N75-12692
ILLINOIS UNIV., SAVOY.
Control authority with a flight performance controller
[AD-784889] N75-11953
Application of response surface methodology to shape discrimination
[AD-785367] N75-12614
Man as a precious resource: The enhancement of human effectiveness in air transport operations
[AD-785368] N75-12620
ILLINOIS UNIV., URBANA.
Debye-Waller measurements in silicon
[COO-1198-1075] N75-12107
Surface acoustic wave notch filter using a phase-shifting technique
[AD-785569] N75-12214
Optimal design of recursive digital filters
[AD-785571] N75-12216
Study of the neon-oxygen laser under heavy particle bombardment
[COO-2007-45] N75-12306
On high level digital system design
[AD-785570] N75-12666
INFORMATICS, INC., ROCKVILLE, MD.
Effects of high power lasers, no. 3
[AD-785401] N75-12316
INNSBRUCK UNIV. [AUSTRIA].
Investigations of plasma instabilities
[AD-784967] N75-12808
INSTITUT FRANCO-ALLEMAND DE RECHERCHES, ST. LOUIS [FRANCE].
On producing a CO2-laser medium for high output with an electric discharge in a supersonic flow
N75-12791
INSTITUTE OF AVIATION MEDICINE, FUERSTENFELDBRUCK [WEST GERMANY].
Time dependence of the flight induced increase of free urinary cortisol secretion in jet pilots
N75-12597
Psychophysiological stress investigations of an instrument-coordination analyzer
N75-12607
Application of human factors engineering data in medical evaluation of flight crews
N75-12611
INTERMETRICS, INC., CAMBRIDGE, MASS.
Modified post-flight processor for CIRIS
[AD-785370] N75-11916
IOWA UNIV., IOWA CITY.
Experiment to evaluate feasibility of utilizing Skylab-EREP remote sensing data of tectonic analysis of the Bighorn Mountains region, Wyoming-Montana
[E75-10014] N75-12395
Numerical and analytical investigation of nonlinear properties of the Vlasov equation
[COO-2059-37] N75-12801

J

JET PROPULSION LAB., CALIF. INST. OF TECH., PASADENA.
Annular arc accelerator shock tube
[NASA-CASE-NPO-13528-1] N75-11997
Viking Mars lander 1975 dynamic test model/orbiter developmental test model forced vibration test
[NASA-CR-140851] N75-12028
Power processor design considerations for a solar electric propulsion spacecraft
[NASA-CR-140842] N75-12064
Error control in the GCF: An information-theoretic model for error analysis and coding
[NASA-CR-140852] N75-12171
Thermocouple installation
[NASA-CASE-NPO-13540-1] N75-12276
Thermostatically controlled nontracking type solar energy concentrator
[NASA-CASE-NPO-13497-1] N75-12429
Lithium-doped solar cell pilot line fabrication and test programs
[NASA-CR-140843] N75-12433
Boundary and object detection in real world images
[NASA-CR-140828] N75-12734
Jupiter radiation belt models [July 1974]
[NASA-CR-140845] N75-12869
Jupiters radiation belts and their effects on spacecraft
[NASA-CR-140841] N75-12870
JOINT PUBLICATIONS RESEARCH SERVICE, ARLINGTON, VA.
Directivity of hydroacoustic antennas
[JPRS-63554] N75-12204
Soviet bloc research in geophysics, astronomy, and space, no. 337
[JPRS-63543] N75-12384
Soviet bloc research in geophysics, astronomy, and space, no. 336
[JPRS-63427] N75-12385
Geotechnological methods for mineral production
[JPRS-63469] N75-12386
Seismic forerunners of destruction
[JPRS-63441] N75-12468
Meteorology and hydrology, no. 8, 1974
[JPRS-63560] N75-12488
Fiftieth anniversary of the Belorussian Hydrometeorological Service
N75-12489
Methods of calculating the variations in the total flux of radiant energy for purposes of long range forecasting of large scale meteorological fields
N75-12490
Method of integrating the spectral equations of the planetary dynamics of the atmosphere
N75-12491
Optimal time assimulation of satellite measurement data for statistical analysis of meteorological fields
N75-12492
Relation of the wind and baric fields in the stratosphere and the lower mesosphere of the tropical zone of the Northern Hemisphere
N75-12493
Atmospheric processes in the 30-60 km layer in 1971 - 1973
N75-12494
Statistical characteristics of the vertical moisture profile in the case of cumulus clouds
N75-12495
Procedure for five-day forecasting of significant and weak precipitation in the territory of Northern Kazakhstan in May - July
N75-12496
Comparison of the diagnostic and forecasting calculations of currents in the lower part of the Atlantic Ocean
N75-12497
Effect of bottom relief on the geostrophic wind currents
N75-12498
Empirical model of the root system of winter wheat considering weather conditions and the soil moisture distribution by layers
N75-12499
Some characteristics of the vertical structure of tropospheric currents in the tropical regions of the east Atlantic
N75-12500
Analysis of two cases of significant precipitation observed in the foothills of northern Tyan'-Shan'
N75-12501
Basic goals and some results of the Soviet National Expedition TROPEX-72 [6 June - 19 September 1972]
N75-12502
Instrument for measuring the concentration of crystalline particles
N75-12503
Method of measuring areas by a curvometer
N75-12504
Simplified method of measuring the length of highly sinuous rivers
N75-12505
Turbulent diffusion in the environment
N75-12506
Meteorology and hydrology, no. 9, 1974
[JPRS-63569] N75-12507
Future climate
N75-12508
Complex studies of the stratospheric aerosol
N75-12509
Problem of using asynchronous meteorological data
N75-12510
New version of the program for operative objective analysis of the geopotential of isobaric surfaces
N75-12511
Causes of the explosive onset and limits of propagation of the summer monsoon in the Indian Ocean
N75-12512
Structure and migration of the equatorial zone of west winds in the Eastern Hemisphere
N75-12513
Study of the heat balance in the boundary layer of the atmosphere according to experimental data
N75-12514
Rate of formation and dissipation of smog in open industrial quarries
N75-12515
Total heat transfer to the atmosphere from the ocean surface in the vicinity of formation of Hurricane Hilda
N75-12516
Application of expansions with respect to natural orthogonal components in the studies of drainage
N75-12517
Automated remote measuring system in agrometeorology
N75-12518
Flood control laws using one and two reservoirs with an exponential type hydrograph
N75-12519

Problem of the method of determining the composition of bottom deposits and suspensions
N75-12520
Technogenic-glacial mud and rock flow in the Khibin mountain mass
N75-12521
Calculating the depth of the freezing of swamps of the flat bog type in the example of the Tarman bog
N75-12522
Accuracy of measuring the amount of precipitation by a single-wave radar
N75-12523
Long range weather forecasting in Japan
N75-12524
Lakes of Mongolia
N75-12525
Continental hydrology. Terms and definitions. GOST 19179-73
N75-12526
Weather forecast and forecast of the agrometeorological conditions for the Fall of 1974 [26 August to 15 October]
N75-12527
Space biology and aerospace medicine, volume 8, no. 5, 1974
[JPRS-63603] N75-12552
Neurophysiological aspects of interaction of the vestibular system with other body sensory systems
N75-12553
Concept of the characteristic time of biological processes and its application for studying the dynamics of gas exchange
N75-12554
Changes in physiological functions of monkeys in a reduced gravitation stand
N75-12555
Morphocytochemical reaction of the suprarenals and thymic-lymphatic system of rats after termination of hypokinesia
N75-12556
Peculiarities in the formation of cataracts in mice after irradiation by 645 MeV protons and Co60 gamma rays
N75-12557
Content of glycogen and glucoso-6-phosphatase activity in the tissues of rabbits after prolonged exposure to the increased pressure of a helium-oxygen atmosphere
N75-12558
Activity of blood enzymes in rabbits exposed to high-mountain hypoxia
N75-12559
Investigation of the dynamics of accumulation of trace elements by chlorella cells during prolonged cultivation
N75-12560
Some problems in evaluating the vestibular function of aviators and cosmonauts
N75-12561
Some regularities in adaptation to prolonged rotation
N75-12562
Function of perception of space coordinates during vestibular trained by active, passive and complex methods
N75-12563
Regional hemodynamics in antiorthostatic tests of different intensity
N75-12564
Wearing of anti-G suit by persons with reduced orthostatic stability
N75-12565
Effect of 30-day hypokinesia on the dynamics of higher nervous activity and sleep of an operator
N75-12566
Optimization of time variable thickness of radiation protection against solar flare protons
N75-12567
Chamber for decompressing the caudal part of the animal body
N75-12568
Respiratory activity sensor using conducting paper
N75-12569
ECG changes in the MX, DS and MC leads in cases of focal and diffuse damage to the cardiac muscle
N75-12570
Phagocytic activity of human blood neutrophils under ordinary conditions of vital functioning and in an isolation chamber
N75-12571
Natural science research application of methods of teaching a machine pattern recognition without a teacher
[JPRS-63501] N75-12632
Peaceful nuclear explosions and the environment
[JPRS-63502] N75-12719
Translations on Eastern Europe: Scientific affairs, no. 439
[JPRS-63487] N75-12829
Katowice Main Information Science Center described
N75-12830
Installation of R-20 computer described
N75-12831
Translations on Eastern Europe: Scientific affairs, no. 440
[JPRS-63573] N75-12832
Operation of Polish equipment used on Interkosmos space satellite described
N75-12833
Thyristor dc electric drive with time-proportional speed control
N75-12834
Electric tow truck for planes described
N75-12835
Translations on Eastern Europe: Scientific affairs, no. 438
[JPRS-63447] N75-12836
Achievements and development prospects of optoelectronics
N75-12837
Development of solid-state microwave electronics
N75-12838
Development of integrated circuits
N75-12839
Development of microwave semiconductors
N75-12840
Development of laser technology
N75-12841

K

KAMAN AEROSPACE CORP., BLOOMFIELD, CONN.
Analysis of unmanned, tethered, rotary-wind platforms
[AD-785581] N75-11903
KANNER (LEO) ASSOCIATES, REDWOOD CITY, CALIF.
Calculation of the flapwise bending, edgewise bending, and torsional vibrations of rotor blades with coupled natural modes and frequencies
[NASA-TT-F-16004] N75-11892
Visiting the solar family
[NASA-TT-F-14795] N75-12013
Study on development of high Mn austenitic heat resisting steel: Choice of base composition and the effect of small additions of Ti and Nb
[NASA-TT-F-16043] N75-12117
Fire protection in electronic installations
[LA-TR-74-17] N75-12165
Optimal concepts of fire protection as a function of the importance of data processing installations
[LA-TR-74-20] N75-12850
KANSAS UNIV. CENTER FOR RESEARCH, INC., LAWRENCE.
Detection of moisture and moisture related phenomena from Skylab
[E75-10035] N75-12405
KENTUCKY UNIV., LEXINGTON.
A feasibility study of limb volume measuring systems
[NASA-CR-140330] N75-12580
KERNFORSCHUNGSANLAGE, JUELICH [WEST GERMANY].
Pyrocarbon and its application to reactor technology
[GERHTR-86] N75-12080
KERNFORSCHUNGSZENTRUM, KARLSRUHE [WEST GERMANY].
Energy and the environment in Baden-Wuerttemberg
[KFK-1966-UF] N75-12439
On-line data acquisition and data processing in a meteorological tower-PDP-8/1-CALAS system coupling
[KFK-1934] N75-12532
Coordination of critical access to distributed databanks in computer networks based on decentralized control
[KFK-1967] N75-12663
KIEL UNIV. [WEST GERMANY].
Problems in the generation of extremely dense plasmas by means of electric wire explosions
N75-12781

L

LABORATOIRE CENTRAL DE RECHERCHES THOMSON-CSF, ORSAY [FRANCE].
Active circuits for integrated optics. Study of a transverse electro-optical effect modulator
[LCR-73-133/R/G.5] N75-12193
Characterization and evaluation of materials for magnetic domain propagation [orthoferrites, garnets]
[REPT-8562] N75-12194
LEHIGH UNIV., BETHLEHEM, PA.
Investigation of the physical origins of noise in Avalanche and Gunn oscillators and noise reduction techniques
[AD-780935/3] N75-12217
Alternating method applied to edge and surface crack problems
[NASA-CR-140846] N75-12353
Load and environment interactions in fatigue crack growth
[AD-785249] N75-12374
LEXINGTON LABS., INC., CAMBRIDGE, MASS.
A low-sidelore antenna-radome study at Ka-band
[AD-785138] N75-12189
LIEGE UNIV. [BELGIUM].
The Liege-balloon program
N75-12739
LIGNES TELEGRAPHIQUES ET TELEPHONIQUES, CONFLANS-SAINTE-HONORINE [FRANCE].
Transmission models for microwave microelectronics using thin films on ferrimagnetic substrates
[REPT-1230/73-143] N75-12192
LINCOLN LAB., MASS. INST. OF TECH., LEXINGTON.
Visible magnitude of typical satellites in synchronous orbits
[AD-785380] N75-12024
The design of multiple access frequency hopping patterns
[AD-785381] N75-12183
Some techniques for testing pseudo-random number sequences
[AD-785379] N75-12688
LIQUID METAL ENGINEERING CENTER, CANOGA PARK, CALIF.
Chemical and physical testing of thermal insulation materials for use at FFTF and SPTF
[LMEC-74-6] N75-12100
LITTLE [ARTHUR D.], INC., CAMBRIDGE, MASS.
M553 sphere forming experiment: Pure nickel specimen evaluation
[NASA-CR-129036] N75-12016
LIVERPOOL UNIV. [ENGLAND].
The use of geometric programming methods for structural optimization
N75-12360
LOCKHEED ELECTRONICS CO., INC., AZUSA, CALIF.
Balloon-borne ultraviolet stellar spectrometer: Acquisition, tracking and command systems
N75-12755
LOCKHEED ELECTRONICS CO., HOUSTON, TEX.
Space shuttle orbiter vehicle star tracker test program plan
[NASA-CR-140349] N75-12025
Correlation of missions 191, 51M and helicopter photography
[NASA-CR-134289] N75-12279
Feasibility study ASCS remote sensing/compliance determination system
[NASA-CR-134288] N75-12419
LOCKHEED MISSILES AND SPACE CO., PALO ALTO, CALIF.
Electrojet power plants in space
N75-12065
Development of a Stationary Plasma Motor [SPM] and its testing on the meteor
N75-12066
Homing, chapter 6
N75-12173
Antennas with controlled position of the directivity pattern in space [scanning antennas], chapter 2
N75-12202
Filters for oscillations of compex shape using varistors and varicaps
N75-12203
Investigation of the heat exchange in demountable connections of cryogenic systems
N75-12239
Analysis of the working process of a free piston expander
N75-12240
Instrument to measure radiant heat fluxes
N75-12280
Determination of the efficiency and angular directivity of cosmic gamma ray detectors
N75-12281
On the interaction of hydromagnetic waves with earth's magnetosphere in a quasi-hydrodynamics approximation
N75-12776
Hydromagnetic wave propagation in a three-dimensional Magnetosphere, 2
N75-12777
LOCKHEED-CALIFORNIA CO., BURBANK.
Measurement and analysis of aircraft far-field aerodynamic noise
[NASA-CR-2377] N75-11982
LOCKHEED-GEORGIA CO., MARIETTA.
Program for establishing long-time flight service performance of composite materials in the center wing structure of C-130 aircraft. Phase 3: Fabrication
[NASA-CR-132495] N75-11957
STOL aircraft design approaches: Noise considerations and performance tradeoffs
N75-11940
LONG ISLAND UNIV., GREENVALE, N.Y.
In situ spectroradiometric calibration of EREP imagery and oceanography of Block Island Sound
[E75-10042] N75-12411
LOS ALAMOS SCIENTIFIC LAB., N.MEX.
X-ray spectrographic determination of iridium in LiH or LiD
[LA-5564] N75-12104
Improved hot-wire electroexplosive devices
[LA-UR-74-743] N75-12157

Fire protection in electronic installations
[LA-TR-74-17] N75-12165
Conductor tests for dc superconducting power transmission
[LA-UR-74-724] N75-12213
Process environment effects on heat pipes for fluid-bed gasification of coal
[LA-UR-74-984] N75-12252
Laser pulse propagation code
[LA-5607-MS] N75-12307
Experimental measurement of in situ stress in granite by hydraulic fracturing
[LA-5605-MS] N75-12388
Energy storage for the electric power industry
[LA-UR-74-918] N75-12447
Creation and comparison of finite difference analogs of some finite element schemes
[LA-UR-74-771] N75-12685
Bell transform
[LA-UR-74-831] N75-12686
Burn characteristics of marginal deuterium-tritium microspheres
[LA-5603-MS] N75-12729
Plasma chemistry and the dynamics of carbon foils irradiated by high intensity laser pulses
[LA-5532-MS] N75-12794
Superconducting magnetic energy storage
[LA-UR-74-737] N75-12814
Optimal concepts of fire protection as a function of the importance of data processing installations
[LA-TR-74-20] N75-12850
Titius-Bode law and the possibility of recent large scale evolution in the solar system
[LA-UR-74-919] N75-12876
Unified model of solar system and galaxy formation based on explosive fragmentation
[LA-5364] N75-12877
Cosmic gamma-ray bursts: A review of the observational data
[LA-UR-74-833] N75-12888

LOVELACE FOUNDATION FOR MEDICAL EDUCATION AND RESEARCH, ALBUQUERQUE, N.MEX.
The tolerance of birds to airblast
[AD-785259] N75-12550

M

MAGNAVOX CO., TORRANCE, CALIF.
TDRSS telecommunications study. Phase 1: Final report
[NASA-CR-139157] N75-12177

MARCONI SPACE AND DEFENCE SYSTEMS LTD., CAMBERLEY [ENGLAND].
A general purpose stabilised balloon platform
N75-12760

MARTIN MARIETTA CORP., BALTIMORE, MD.
Skylab program payload integration. TO27 sample array
[NASA-CR-120531] N75-12011

MARTIN MARIETTA CORP., DENVER, COLO.
Scheduling language and algorithm development study. Appendix: Study approach and activity summary
[NASA-CR-140363] N75-12630

MARTIN MARIETTA LABS., BALTIMORE, MD.
Observations on the stress corrosion cracking of an Al-5 percent Zn-2.5 percent Mg ternary and various quarternary alloys
[AD-785020] N75-12142

MARYLAND UNIV., COLLEGE PARK.
Drag force on objects in the nearly free molecular flow regime as a function of speed ratio
[AD-785351] N75-12265

MASSACHUSETTS INST. OF TECH., CAMBRIDGE.
User's guide to four-body and three-body trajectory optimization programs
[NASA-CR-139156] N75-12020
Design of the software development and verification system [SWDVS] for shuttle NASA study task 35
[NASA-CR-140341] N75-12038
A model for the electrostatic charging process in fuel filtration
[PUBL-74-4] N75-12205
Osmosis and ion transport in charged porous membranes: A macroscopic, mechanistic model
[PUBL-74-6] N75-12242
The connection between intermittent turbulent activity near the wall of a turbulent boundary layer with pressure fluctuations at the wall
[AD-785271] N75-12258
Reliability history of the Apollo guidance computer
[NASA-CR-140340] N75-12345
New England Continental Shelf dynamics pilot experiment
[AD-785257] N75-12542
Model of human dynamic orientation
[NASA-CR-132537] N75-12585
Investigation of pilot's role and display requirements in automatic landings
[NASA-CR-140844] N75-12617
An orientable, stabilized balloon-borne gondola for around-the-world flights
N75-12743
Optical stellar interferometry for satellite surveillance
[AD-784947] N75-12866

MASSACHUSETTS UNIV., AMHERST.
Balloon-borne infrared coronagraph
N75-12736

MATERIALS RESEARCH LABS., MARIBYRNONG [AUSTRALIA].
Calibration of a 1 to 10kg set of masses
[TN-352] N75-12706

MAX-PLANCK-INSTITUT FUER PHYSIK UND ASTROPHYSIK, MUNICH [WEST GERMANY].
A shear flow instability due to the finite ion gyroradius
[MPI-PAE/EXTRATERR-96] N75-12774

MAX-PLANCK-INSTITUT FUER PLASMAPHYSIK, GARCHING [WEST GERMANY].
Tritium economy and tritium safety of fusion power plants
[IPP-4/112] N75-12728

MCDONNELL-DOUGLAS ELECTRONICS CO., ST. CHARLES, MO.
Synchronization station location study: Tradeoff phase
[AD-785335] N75-11921

MCGILL UNIV., MONTREAL [QUEBEC].
Flutter of conservative systems of pipes containing subsonic flow
[MERL-TN-73-2] N75-12236
The effect of material damping on the dynamics of a vertical tubular cantilever conveying fluid
[MERL-TN-74-1] N75-12355
Nonlinear effects: Amplifiers and convolvers
N75-12702

MESSERSCHMITT-BOELKOW-BLOHM G.M.B.H., HAMBURG [WEST GERMANY].
Europlane QTOL: A European project proposal
N75-11941
Europlane QTOL: Design parameter tradeoffs
N75-11942
Investigations into aircraft noise reduction by shielding
N75-11949

MESSERSCHMITT-BOELKOW-BLOHM G.M.B.H., OTTOBRUNN [WEST GERMANY].
Measurement and estimation procedure for flight safety control operator workload
N75-12609

MICHIGAN STATE UNIV., EAST LANSING.
Application of wave mechanics theory to fluid dynamics problems: Fundamentals
[NASA-CR-140847] N75-12228
Application of wave mechanics theory to fluid dynamics problems: Flat plate flow
[NASA-CR-140848] N75-12229
Application of wave mechanics theory to fluid dynamics problems: Boundary layer on a circular cylinder including turbulence
[NASA-CR-140849] N75-12230

MICHIGAN UNIV., ANN ARBOR.
Friction and temperature rise in aircraft tires
[NASA-CR-134666] N75-11929
Numerical models for precipitation scavenging
[COO-1407-52] N75-12474
Human information processing: An assessment and research battery
[AD-785411] N75-12613
Mathematical modelling and identification theory
[AD-785425] N75-12687

MIDWEST RESEARCH INST., KANSAS CITY, MO.
Vaporization kinetics and thermodynamics of graphite using the high pressure mass spectrometer
[AD-785136] N75-12113

MINNESOTA UNIV., MINNEAPOLIS.
A study of Minnesota forests and lakes using data from Earth Resources Technology Satellites
[NASA-CR-140865] N75-12421
Environmental microbiology as related to planetary quarantine
[NASA-CR-140941] N75-12622
Superconducting properties of bulk and thin film A15 compounds
[AD-785014] N75-12818

MITRE CORP., BEDFORD, MASS.
Consideration of near field effects in Microwave Landing System [MLS] feasibility evaluation
[AD-784854] N75-12004

MITRE CORP., MCLEAN, VA.
An advanced air traffic management concept based on extension of the upgraded third generation ATC system. System B: Airport capacity analysis
[AD-785334] N75-11917
An advanced air traffic management concept based on extensions of the upgraded third generation ATC system
[AD-785023] N75-11919
An advanced air traffic management concept based on extensions of the upgraded third generation ATC system. System B: ATC automation analysis
[AD-785312] N75-11923
An advanced air traffic management concept based on extensions of the upgraded third generation ATC system. System B: System cost analysis
[AD-785313] N75-11924
An advanced air traffic management concept based on extensions of the upgraded third generation ATC system. System B: Discrete Address Beacon System [DABS] accuracy and coverage requirements
[AD-785311] N75-11925
An advanced air traffic management concept based on extensions of the upgraded third generation ATC system. System B: 1995 Los Angeles Basin traffic model, volume 1
[AD-785309] N75-11926
An advanced air traffic management concept based on extensions of the upgraded third generation ATC system. System B: 1995 Los Angeles Basin traffic model, volume 2
[AD-785310] N75-11927
An advanced air traffic management concept based on extensions of the upgraded third generation ATC system. System B: Air traffic activity projections for 1995
[AD-785308] N75-11928

MITSUBISHI HEAVY-INDUSTRIES, LTD., TOKYO [JAPAN].
A study on gas-liquid contact apparatus rotary atomizer
[BULL-93] N75-12231

MODERN SYSTEMS ANALYSIS, INC., ANN ARBOR, MICH.
Neighboring optimal guidance theory and computer program
[NASA-CR-140332] N75-12631

MONSANTO CO., ST. LOUIS, MO.
Molding of oriented short-fiber composites. 4: Characterization of fiber orientation patterns
[AD-785266] N75-12084

MOTOREN- UND TURBINEN-UNION MUENCHEN G.M.B.H. [WEST GERMANY].
Propulsion concepts for STOL aircraft
N75-11948

MOUND LAB., MIAMISBURG, OHIO.
Design of a heat source for a Navy radioisotopic power generator
[MLM-2103] N75-12444

N

NATIONAL ACADEMY OF SCIENCES - NATIONAL RESEARCH COUNCIL, WASHINGTON, D.C.
Automated analysis of oxidative metabolites
[NASA-CASE-ARC-10469-1] N75-12086
Method of preparing water purification membranes
[NASA-CASE-ARC-10643-1] N75-12087
Method of forming aperture plate for electron microscope
[NASA-CASE-ARC-10448-2] N75-12732

NATIONAL AERONAUTICAL ESTABLISHMENT, OTTAWA [ONTARIO].
Reverification of the NAE 100,000-lb deadweight standard force machine
[NRC-14354] N75-12002

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. AMES RESEARCH CENTER, MOFFETT FIELD, CALIF.
Automated analysis of oxidative metabolites
[NASA-CASE-ARC-10469-1] N75-12086
Method of preparing water purification membranes
[NASA-CASE-ARC-10643-1] N75-12087
Nulling device for detection of trace gases by NDIR absorption
[NASA-CASE-ARC-10760-1] N75-12275
Systems study of an automated fire weather data system
[NASA-TM-X-62402] N75-12277
Effects of various runway lighting parameters upon the relation between runway visual range and visual range of centerline and edge lights in fog
[NASA-TM-X-72112] N75-12604
Method of forming aperture plate for electron microscope
[NASA-CASE-ARC-10448-2] N75-12732
Telescope Systems for Balloon-Borne Research
[NASA-TM-X-62397] N75-12735
AIROscope: Ames infrared balloon-borne telescope
N75-12747
AIROscope stellar acquisition
N75-12757
The AIROscope pointing and stabilization system
N75-12758
Airoscope telemetry system
N75-12762
Airoscope command system
N75-12763

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. GODDARD SPACE FLIGHT CENTER, GREENBELT, MD.
Mission design for a ballistic slow flyby Comet Encke 1980
[NASA-TN-D-7726] N75-12012
The SAS-D nutation control system
[NASA-TM-X-65944] N75-12039

Mechanical properties of Skylab thermal shield materials after prolonged ultraviolet irradiation
[NASA-TN-D-7844] N75-12144
Structural heat pipe
[NASA-CASE-GSC-11619-1] N75-12222
A mid-latitude ozone model for the US standard atmosphere, 1975 [summary]
[NASA-TM-X-70786] N75-12469
What is special about Cygnus X-1?
[NASA-TM-X-70791] N75-12862
A new measurement of the Her X-1 X-ray pulse profile
[NASA-TM-X-70578] N75-12863
Features of polar cusp electron precipitation associated with a large magnetic storm
[NASA-TM-X-70792] N75-12873
Microscale Alfven waves in the solar wind at 1 AU
[NASA-TM-X-70793] N75-12874
Directional discontinuities from Mariner 5 and solar wind structure
[NASA-TM-X-70733] N75-12884
Interstellar scattering of pulsar radiation. 1: Scintillation
[NASA-TM-X-70789] N75-12887

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. JOHN F. KENNEDY SPACE CENTER, COCOA BEACH, FLA.

Signal conditioner test set
[NASA-CASE-KSC-10750-1] N75-12270
Computer simulation of the threshold sensitivity determinations
[NASA-TN-D-7663] N75-12690

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LANGLEY RESEARCH CENTER, LANGLEY STATION, VA.

Effects of leading edge sweep angle and design lift coefficient on performance of a modified arrow wing at a design Mach number of 2.6
[NASA-TN-D-7753] N75-11893
A wind tunnel investigation of the wake near the trailing edge of a deflected externally blown flap
[NASA-TM-X-3079] N75-11896
Aerodynamic roll damping of a T-tail transport configuration
[NASA-TM-X-3115] N75-11898
Numerical methods for the design and analysis of wings at supersonic speeds
[NASA-TN-D-7713] N75-11930
A wind-tunnel investigation of parameters affecting helicopter directional control at low speeds in ground effect
[NASA-TN-D-7694] N75-11931
Subsonic wind tunnel investigation of a twin-engine attack airplane model having nonmetric powered nacelles
[NASA-TN-D-7742] N75-11932
A motion-constraint logic for moving-base simulators based on variable filter parameters
[NASA-TN-D-7777] N75-11933
A forebody design technique for highly integrated bottom-mounted scramjets with application to a hypersonic research airplane
[NASA-TM-X-71971] N75-11973
The cryogenic wind tunnel concept for high Reynolds number testing
[NASA-TN-D-7762] N75-12000
Simulation of flight test conditions in the Langley pilot transonic cryogenic tunnel
[NASA-TN-D-7811] N75-12001
Analysis and compensation of an aircraft simulator control loading system with compliant linkage
[NASA-TN-D-7747] N75-12003
A method for determining optimum phasing of a multiphase propulsion system for a single-stage vehicle with linearized inert weight
[NASA-TN-D-7792] N75-12063
A simulation of synthetic aperture radar imaging of ocean waves
[NASA-TM-X-72629] N75-12172
Deploy/release system
[NASA-CASE-LAR-11575-1] N75-12195
Effect of nonsymmetrical flow resistance upon orifice impedance resistance
[NASA-TM-X-72624] N75-12233
Turbulent heat transfer prediction method for application to scramjet engines
[NASA-TN-D-7810] N75-12234
Sweep effect on the drag of rows of perpendicular circular cylinders in a laminar boundary layer at supersonic free-stream velocities
[NASA-TN-D-7812] N75-12235
Weak incident shock interactions with Mach 8 laminar boundary layers
[NASA-TN-D-7835] N75-12243
Numerical and experimental studies of the natural convection within a horizontal cylinder
[NASA-TN-D-7728] N75-12244
Apparatus for microbiological sampling
[NASA-CASE-LAR-11069-1] N75-12272
Method of making an explosively welded scarf joint
[NASA-CASE-LAR-11211-1] N75-12326
Sizing of complex structure by the integration of several different optimal design algorithms
[L-9738] N75-12361
The influence of surface waves on water circulation in a mid-Atlantic continental shelf region
[NASA-TN-D-7771] N75-12537
Proton tissue dose for the blood forming organ in human geometry: Isotropic radiation
[NASA-TM-X-3089] N75-12573
Determining particle density using known material Hugeniot curves
[NASA-CASE-LAR-11059-1] N75-12810
Radiative property data for Venusian entry: A compendium
[NASA-SP-348] N75-12880
Estimates of radiation exposure from solar cosmic rays in SST altitudes
[NASA-TM-X-71990] N75-12883

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LEWIS RESEARCH CENTER, CLEVELAND, OHIO.

Distortion in a full-scale bicone inlet with internal focused compression and 45 percent internal contraction
[NASA-TM-X-3133] N75-11970
Continuous-output terminal-shock-position sensor for mixed-compression inlets evaluated in wind tunnel tests of YF-12 aircraft inlet
[NASA-TM-X-3144] N75-11971
Effect of treated length on performance of full scale turbofan inlet noise suppressors
[NASA-TN-D-7826] N75-11978
Effect of Oxygen addition on altitude blowout and relight of an experimental combustor segment
[NASA-TM-X-3154] N75-12070
Surface recrystallization theory of the wear of copper in liquid methane
[NASA-TN-D-7840] N75-12124
Hardness behavior of binary and ternary niobium alloys at 77 and 300 K
[NASA-TN-D-7847] N75-12127
Effect of exposure cycle on hot salt stress corrosion of a titanium alloy
[NASA-TM-X-3145] N75-12128
Some observations of the effects of radial distortions on performance of a transonic rotating blade row
[NASA-TN-D-7824] N75-12245
Refinement in black chrome for use as a solar selective coating
[NASA-TM-X-3136] N75-12329
Operating characteristics of 120-millimeter-bore ball
[NASA-TN-D-7837] N75-12330
Performance and durability of improved air-atomizing splash-cone fuel nozzles
[NASA-TM-X-3156] N75-12334

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LYNDON B. JOHNSON SPACE CENTER, HOUSTON, TEX.

Coal conversion and usage: A systems study
[NASA-TM-X-58157] N75-12434
Ultraviolet stellar spectrophotometry from a balloon platform
N75-12746

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. MARSHALL SPACE FLIGHT CENTER, HUNTSVILLE, ALA.

Phase A conceptual design study of the Atmospheric, Magnetospheric and Plasmas in Space [AMPS] payload
[NASA-TM-X-64895] N75-12014
An assessment of the Instrument Pointing Subsystems [IPS] requirements for spacelab missions
[NASA-TM-X-64896] N75-12018
Skylab mission planning support through the use of a hybrid simulation
[NASA-TM-X-64889] N75-12037
Status of flow separation prediction in liquid propellant rocket nozzles
[NASA-TM-X-64890] N75-12061
System for depositing thin films
[NASA-CASE-MFS-20775-1] N75-12161
Ultrasonic bone densitometer
[NASA-CASE-MFS-20994-1] N75-12271
Strain gauge ambiguity sensor for segmented mirror active optical system
[NASA-CASE-MFS-20506-1] N75-12273
Airborne Visible Laser Optical Communications [AVLOC] experiment
[NASA-TM-X-64894] N75-12296
A self-lubricating bearing
[NASA-CASE-MFS-23009-1] N75-12328
Application of a single laser Doppler system to the measurement of atmospheric winds
[NASA-TM-X-64891] N75-12462
Orthotic arm joint
[NASA-CASE-MFS-21611-1] N75-12616
Results of induced atmosphere measurements from the Apollo program
[NASA-TN-D-7854] N75-12875

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. PASADENA OFFICE, CALIF.

Annular arc accelerator shock tube
[NASA-CASE-NPO-13528-1] N75-11997
Thermocouple installation
[NASA-CASE-NPO-13540-1] N75-12276
Thermostatically controlled nontracking type solar energy concentrator
[NASA-CASE-NPO-13497-1] N75-12429
Multi-computer multiple data path hardware exchange system
[NASA-CASE-NPO-13422-1] N75-12652

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, WASHINGTON, D.C.

The final Skylab mission: Man at home and at work in space
[NASA-TM-X-70394] N75-12019
Fabrication technology: A compilation
[NASA-SP-5978[02]] N75-12162
Electronic equipment, systems, and techniques: A compilation
[NASA-SP-5972[01]] N75-12200
Measurement, testing, and safety technology: A compilation
[NASA-SP-5976[01]] N75-12343
Our prodigal sun
[NASA-EP-118] N75-12885

NATIONAL AEROSPACE LAB., AMSTERDAM (NETHERLANDS).

A simulator study to investigate human operator workload
N75-12589

NATIONAL BUREAU OF STANDARDS, BOULDER, COLO.

Materials research in support of superconducting machinery
[AD-780596/3] N75-12138

NATIONAL BUREAU OF STANDARDS, WASHINGTON, D.C.

NBS FORTRAN test programs. Volume 2: Listings for version I
[NBS-SP-399-VOL-2] N75-12628
NBS FORTRAN test programs. Volume 3: Listings for Version 3
[NBS-SP-399-VOL-3] N75-12629

NATIONAL CENTER FOR ATMOSPHERIC RESEARCH, BOULDER, COLO.

The National Scientific Balloon Facility
N75-12751
NCAR telemetry and command system
N75-12761

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, MIAMI, FLA.

An assessment of the potential contributions to oceanography from Skylab visual observations and hand-held photography
[E75-10017] N75-12396

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, WASHINGTON, D.C.

A cloud physics investigation utilizing Skylab data
[E75-10021] N75-12400

NATIONAL SCIENTIFIC LABS., INC., MCLEAN, VA.

AAFE man-made noise experiment project. Volume 1: Introduction experiment definition and requirements
[NASA-CR-132509] N75-12168
AAFE man-made noise experiment project. Volume 2: Project and experiment discussions
[NASA-CR-132510] N75-12169
AAFE man-made noise experiment project. Volume 3: Appendices
[NASA-CR-132511] N75-12170

NAVAL ACADEMY, ANNAPOLIS, MD.

Development of an improved technique for forming acrylic spheres
[AD-784113] N75-12337
The nonlinear growth of hurricanes through CISK
[AD-782662/1] N75-12535

NAVAL AEROSPACE MEDICAL RESEARCH LAB., PENSACOLA, FLA.

Criteria for personal dosimetry in mixed radiation fields in space
[NASA-CR-140365] N75-12574

NAVAL AIR DEVELOPMENT CENTER, WARMINSTER, PA.

Cleaning and corrosion control of avionics equipment at all levels of maintenance
[AD-784975] N75-11968
Vibration energy density spectra in response domain for viscous damped elastic systems with sinusoidal and broadband random excitation
[AD-784974] N75-12383
Specification for visual target acquisition system AN/AVG-8A [XJ-1] flight test program interface control document SH 4506-02-73
[AD-779909] N75-12769

NAVAL AIR ENGINEERING CENTER, PHILADELPHIA, PA.

In-airframe ground runup noise suppressor program
[AD-785246] N75-11986

NAVAL ELECTRONICS LAB. CENTER, SAN DIEGO, CALIF.

Power requirements for magneto-optic modulation devices, a theoretical study
[AD-784977] N75-12772

NAVAL INTELLIGENCE SUPPORT CENTER, WASHINGTON, D.C.

Kivach-1 and Kivach-2 marine navigation radar sets
[AD-785338] N75-11920

NAVAL ORDNANCE LAB., WHITE OAK, MD.

A three-dimensional structure model for a high modulus pan-based carbon fiber
[AD-784415] N75-12085

Approximate analysis of heat transfer in transpired boundary layers at limiting Prandtl numbers
[AD-785239] N75-12255
Taxicrinic processors of the Illiac 3: Architectural design
[TID-26602] N75-12664
Modular asynchronous control design
[TID-26601] N75-12670

NAVAL POSTGRADUATE SCHOOL, MONTEREY, CALIF.
Metal oxidation laser
[AD-784760] N75-12312
The characterization of the reversion stress for NiTi
[AD-784761] N75-12373
Analysis of ballistic calibration data and government/contractor CEP test data with respect to the AN/TPQ-27 contract incentive fee determination
[AD-781373] N75-12709

NAVAL RESEARCH LAB., WASHINGTON, D.C.
Information storage in photodichroic crystals
[AD-785005] N75-12109
Prevention and control of subcritical crack growth in high-strength metals
[AD-785233] N75-12135
Acoustic emissions and stress-corrosion cracking in high-strength alloys
[AD-785009] N75-12136
Fracture toughness characterization of shipbuilding steels
[AD-785034] N75-12141
Proposed method and device for obtaining piezoelectric constants of ceramic cylindrical shells
[AD-785008] N75-12150
Review of current radar intereats and extending the radar spectrum to the HF and the milimeter wave bands
[AD-785007] N75-12190
Comparison of a cube-textured-nickel and a nickel-200 magnetostrictive ring transducer
[AD-785012] N75-12215
Response of materials to laser radiation: A short course
[AD-785010] N75-12314
ARPA-NRL laser program
[AD-785234] N75-12315
Analysis of VUV and X-ray lasers pumped by a traveling-wave source
[AD-784995] N75-12318
High energy laser windows
[AD-784991] N75-12319
Solar-geophysical effects on northern and mid-latitude ELF propagation
[AD-785011] N75-12711
Evaluating the Helmholtz integral. Part 1: Basic theory
[AD-785013] N75-12715
Applicability of absorber-ratio methods to beam-plasma systems
[AD-785238] N75-12802

NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER, ANNAPOLIS, MD.
Rolamite rolling-gate valves
[AD-785229] N75-12340

NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER, BETHESDA, MD.
Two-dimensional subsonic evaluation of a 15-percent thick circulation control airfoil with slots at leading and trailing edges
[AD-785230] N75-11954

NAVAL UNDERSEA CENTER, SAN DIEGO, CALIF.
Limiting statistics of fixed-point multiplication errors in digital filters with coefficients of arbitrary word length
[AD-784982] N75-12185

NAVAL WEAPONS CENTER, CHINA LAKE, CALIF.
A unified theory of solid propellant ignition. Part 1: Development of mathematical model
[AD-785231] N75-12158
A unified theory of solid propellant ignition. Part 2: Computer program
[AD-785232] N75-12159

NAVY MEDICAL NEUROPSYCHIATRIC RESEARCH UNIT, SAN DIEGO, CALIF.
Emotional and biochemical effects of high workload
N75-12598

NEW YORK UNIV., N.Y.
Study of field-plasma interaction by transient techniques
[AD-785404] N75-12805
Electronic structure and bonding of actinide complexes
[COO-3077-53] N75-12816

NORGES TEKNISKE HOEGSKOLE, TRONDHEIM.
Wave interactions in lossy periodic media
[AD-784660] N75-12826

NORTH CAROLINA STATE UNIV., RALEIGH.
The resistance of selected high strength alloys to embrittlement by a hydrogen environment
[NASA-CR-140957] N75-12115
The resistance to embrittlement by a hydrogen environment of selected high strength iron-manganese base alloys
[NASA-CR-140956] N75-12116
Adaptive differential PCM speech transmission
[AD-785124] N75-12191

NORTHWESTERN UNIV., EVANSTON, ILL.
Spatial and temporal variations in geometric and material properties of a natural beach
[AD-785572] N75-12389

O

OAK RIDGE GASEOUS DIFFUSION PLANT, TENN.
Application of eddy currents to detect corrosion in copper and stainless steel tubing
[K-1860] N75-12134

OAK RIDGE NATIONAL LAB., TENN.
Temperature dependence of the ferromagnetic resonance linewidth of lunar soils, iron and magnetite precipitates in simulated lunar glasses, and nonspherical metallic iron particles
[CONF-740321-2] N75-12106
Stress analysis of a radial nozzle attached to a cylindrical shell under internal pressure
[ORNL-TM-4269] N75-12366
Properties of thick type 308 stainless steel welds with controlled residual elements
[ORNL-TM-4206] N75-12369
Residential energy conservation
[TID-26534] N75-12442
Estimated quantities of materials contained in a 1000-MW[e] PWR power plant
[ORNL-TM-4515] N75-12721
Effect of charge exchange reactions on neoclassical transport
[ORNL-TM-4606] N75-12727
ORNL isotopic power fuels
[ORNL-4978] N75-12730
Approximate Fokker-Planck operators for Coulomb collisions
[ORNL-TM-4605] N75-12815
Some surface properties of Apollo 17 soils
[CONF-740321-3] N75-12881
Calculating the daily variations of solar energy incident on flat plates
[ORNL-TM-4564] N75-12886

OAK RIDGE Y-12 PLANT, TENN.
Influence of tool feed [IN/REV] on the machinability of CO2 laser optics
[Y-DA-5786] N75-12305

OHIO STATE UNIV., COLUMBUS.
Analysis of strip antennas in the presence of a dielectric inhomogeneity
[NASA-CR-140854] N75-12201

OHIO UNIV., ATHENS.
Omega flight-test data reduction sequence
[NASA-CR-140827] N75-11911
Low cost omega navigation receiver
[NASA-CR-140853] N75-11912
Instrument landing system improvement program: Environmental study of the 200 foot aperture slotted cable localizer antenna array
[AD-785025] N75-12009
Ganged series potentiometer mixer networks
[NASA-CR-140850] N75-12209

P

PACIFIC SOUTHWEST FOREST AND RANGE EXPERIMENT STATION, BERKELEY, CALIF.
Inventory of forest and rangeland resources, including forest stress
[E75-10032] N75-12402

PENNSYLVANIA STATE UNIV., UNIVERSITY PARK.
Effect of blade row geometry on axial flow rotor unsteady response to inflow distortions
[AD-785276] N75-11991

PENNSYLVANIA UNIV., PHILADELPHIA.
Mass and stability of rigidly rotating relativistic polytropes
[COO-3071-95] N75-12864

PITTSBURGH UNIV., PA.
Hydrogen solubility in 1:5 compounds between Y or Th and Ni or Co
[COO-3429-19] N75-12076
Solubility of H2 in RCo3 compounds
[COO-3429-20] N75-12108
Studies of the airglow, the aurora, the ion and neutral composition, and the chemistry of the terrestrial atmosphere
[NASA-CR-140960] N75-12473
Surface and bulk electronic properties of magnetic materials
[AD-785426] N75-12824

PRATT AND WHITNEY AIRCRAFT, EAST HARTFORD, CONN.
Impact resistance of hybrid composite fan blade materials
[NASA-CR-134712] N75-12077

PRATT AND WHITNEY AIRCRAFT, WEST PALM BEACH, FLA.
Effect of swirling flow on augmentor performance
[NASA-CR-134639] N75-11972
Turbine gas temperature measurement and control system
[NASA-CR-140971] N75-11987

PRINCETON UNIV., N.J.
Fundamental and applied research on core engine/combustion noise of aircraft engines
[NASA-CR-140860] N75-11974
Research on noise generated by ducted air-fuel combustion systems
[AD-785028] N75-11992
Investigation of the starting transients of high performance solid-propellant motors
[NASA-CR-140800] N75-12060
Pulsed electromagnetic gas acceleration
[NASA-CR-140996] N75-12775

PURDUE UNIV., LAFAYETTE, IND.
Some new algorithms for deterministic and probabilistic communication networks
[AD-785119] N75-12184
On the flow near a weak shock wave downstream of a nozzle throat
[AD-785283] N75-12257
Clustering of water on hydrated protons in a supersonic free jet expansion
[AD-785284] N75-12263
An interdisciplinary analysis of multispectral satellite data for selected cover types in the Colorado Mountains, using automatic data processing techniques
[E75-10002] N75-12390

R

RADIO CORP. OF AMERICA, PRINCETON, N.J.
Design, processing, and testing of LSI arrays for space station
[NASA-CR-120539] N75-12437

RAND CORP., SANTA MONICA, CALIF.
Energy consumption by industries in support of national defense: An energy demand model
[AD-784964] N75-12449
A correction for middleton's visible and infrared radiation extinction coefficients due to rain
[AD-785121] N75-12771

RAYTHEON CO., BEDFORD, MASS.
Modular digital missile guidance system study
[AD-784969] N75-12054

RCA RESEARCH LABS., SAINTE ANNE DE BELLEVUE [QUEBEC].
Interdigital transducers and acoustic-surface-wave filters
N75-12698

RENSSELAER POLYTECHNIC INST., TROY, N.Y.
Strength and durability of a glass-ceramic containing spodumene crystals
[AD-783087/0] N75-12151

RESEARCH INST. OF NATIONAL DEFENCE, STOCKHOLM [SWEDEN].
FORTRAN program for calculating the trajectory of projectiles
[FOA-2-A-2564-D8] N75-11894
Measurement of splinter retardation by means of Doppler radar, introductory points of view
[FOA-2-C-2567-D4] N75-11895
Ground effect devices for transport of personnel and goods over short distances using air suspension
[FOA-2-A-2566-F8[F3]] N75-11897
Information on attack helicopters: A comparison
[FOA-2-C-2597-F8] N75-11934
Future scientific research: The elites new Latin or a new name for some old ways of thinking
[FOA-P-C-8347-M5] N75-11981
On the possibilities of a directly igniting fusion charge
[FOA-4-C-4530-A1] N75-12095
Report on attendance at Arbeitstagung: Gase in Metallen at Darmstadt and visits to August-Thyssen-Hutte AG at Duisburg and the Max Planck Institute at Stuttgart, March 1972
[FOA-4-C-4519-F3] N75-12126
Properties and structure of some ceramics used for, or adapted for, lightweight armour
[FOA-4-C-4532-D6] N75-12148
Observations on blast explosions at Medeo, USSR, 1966
[FOA-4-C-4523-A1] N75-12156
The 7th URSI Congress in Warsaw, 1972
[FOA-3-C-3738-E8] N75-12175
Communication link with CO2 laser
[FOA-2-C-2584-E2] N75-12176
Inaccuracy in measurements and calibrations
[FOA-3-C-3734-E8] N75-12206
Experiments on conventional excess voltage transient protection as a protection against an EMP transient
[FOA-4-C-4526-A3] N75-12207
Some analogue control techniques in applied fluidics
[FOA-2-C-2576-E4] N75-12241
Third International Conference on Numerical Methods in Fluid Dynamics
[FOA-4-C-4518-A2] N75-12249

Summarized results of tests on Singer-Kearfott's gyroflex gyro
[FOA-2-A-2562-E4] N75-12282
Recordings of the spectral-radio-meter SIGNE during the summer of 1972
[FOA-2-C-2577-E1] N75-12283
Apparatus for the automatic recorded weighing of fragments
[FOA-2-A-2568-D4] N75-12286
A relaxometer for polymer material
[FOA-4-C-4533-G2] N75-12287
On the possibilities of using a laser in transmission equipment for sighting measurements
[FOA-P-C-8362-M7] N75-12297
Experiment with laser communication
[FOA-2-C-2575-E2] N75-12298
Measurement of CO2-laser radiation attenuation in the atmosphere
[FOA-2-C-2565-E3-E4-E6] N75-12299
Laser cane for the blind
[FOA-2-C-2595-H5] N75-12300
Skidproof dyes for concrete and asphalt
[FOA-2-C-2592-E6] N75-12333
Experiments with a catalytic cleaner for car engine exhaust gases
[FOA-1-C-1492-H3] N75-12455
Seismic magnitudes from explosions and earthquakes obtained at the Hagfors and Matsushiro Observatories
[FOA-C-20010-T1] N75-12465
Seismic events in the USSR in 1972
[FOA-C-20018-T1] N75-12470
A study of literature on methods to determine the effect on visibility of the atmospheric particle concentration, size and distribution
[FOA-2-C-2606-E1] N75-12471
The E region of this ionosphere at night time: A literature study
[FOA-3-C-3731-E1] N75-12472
On the form of spectra of radar echoes from precipitation
[FOA-P-C-8351-M7] N75-12528
Recovery time after being dazzled, as a function of age
[FOA-2-C-2587-E1] N75-12576
Detectability of an unsharp edge in additive noisy background
[FOA-2-C-2591-E1-H5] N75-12577
Changes in mass of biological cells when irradiated with Q-pulsed ruby laser
[FOA-2-C-2586-E6] N75-12578
Variability in reaction response
[FOA-2-C-2581-H5] N75-12586
LECO: A compacting and editing program
[FOA-P-C-8353-M3[E5]] N75-12634
Introduction to LECO
[FOA-P-C-8355-M3[E5]] N75-12635
Routines for using screen presentation of EMR 6130 equipment
[FOA-3-C-3727-E5] N75-12637
Introduction to the structure of dialogue directed computer programs
[FOA-P-C-8361-M3] N75-12638
PL360 compiler with macros
[FOA-P-C-8359-M3[E5]] N75-12639
FOA Index adaptation of ILO's information system ISIS for operating in the Computer Center, Stockholm in cooperation with the State Office
[FOA-P-C-8360-M7] N75-12654
Duration of program for program optimization
[FOA-P-C-8350-M3[E5]] N75-12655
A review of picture processing by computer
[FOA-2-C-2583-E1] N75-12656
Flexible table printing subroutines in FORTRAN
[FOA-2-C-2590-E5] N75-12657
A program for listing card indices for A4 reports
[FOA-2-C-2589-E5] N75-12658
X-FOC: A help program for 8-16 K TIROS-FOCAL
[FOA-1-C-1507-C2[C4]] N75-12659
A system for input and output of digital pictures
[FOA-2-C-2575-E1] N75-12660
The automatic computation of the coefficients in a class of modified multistep methods
[FOA-2-C-2571-M4] N75-12676
Modified multistep methods for the numerical solution of a class of stiff ordinary differential equations
[FOA-2-C-2570-M4] N75-12677
An experimental study of coupling effects in a planar array antenna
[FOA-3-C-3728-E2] N75-12704
The work of the institution for radio wave propagation [Institution 345]
[FOA-3-C-3726-E8] N75-12705
A high intensity flash X-ray tube
[FOA-2-C-2580-E8] N75-12716
Information theory aspects of long range analyses
[FOA-2-C-2568-E1] N75-12848
Description of some experimental methods with adaptive planning
[FOA-P-C-8339-M3] N75-12853
Computer program for town analysis. Changes arising from converting from IBM 7090 to IBM 360/75
[FOA-4-C-4515-A4] N75-12859
Review of an amplifier tube for pictures at low light levels
[FOA-2-C-2585-E1-E3] N75-12889
LYSTER: Air defence surface protection capability in Swedish terrain
[FOA-P-C-8349-M1] N75-12890

RESEARCH INST. OF NATIONAL DEFENCE, SUNDBYBERG [SWEDEN].
Examination of an object from space
[FOA-1-A-1562-F5] N75-12023
Control unit for the control system of a rocket with liquid type engine
[FOA-1-C-1471-D3] N75-12068
Chemical reaction engineering
[FOA-1-C-1515-H3] N75-12073
Report on the 9th International Symposium on Chromatography
[FOA-1-C-1489-C4] N75-12096
Fifth International Congress on Metal Corrosion
[FOA-1-C-1493-G3[G1]] N75-12129
Catalytic breakdown of hydrazine
[FOA-1-C-1488-D3] N75-12154
GAUST: A computer program for calculating gas flow from holders containing condensed gas
[FOA-1-C-1498-C3[H6]] N75-12247
Digital data collection with A/D-transducer DEC AF01, tape player AMPEX FR1300 and computer pdp-8/1
[FOA-1-C-1497-D1] N75-12288
Methods of cleaning and servicing air supplies, and their control
[FOA-1-A-1561-H3] N75-12453
Methods for analysis of nitrogen monoxide and nitrogen dioxide in the atmosphere and in exhaust gases. A literature search
[FOA-1-C-1469-H3] N75-12454
Computer treatment of climatic research data: Table type A
[FOA-1-C-1503-M4[H5-H6]] N75-12530
A system of computer programs for recording the activity of mice
[FOA-1-C-1478-M4] N75-12545
Computer treatment of climatic research data. Table type B
[FOA-1-C-1504-M4[H5-H6]] N75-12624
Supporting program and program system for the assembly program in Tiros
[FOA-1-C-1470-C4] N75-12633
FORTRAN dialects: A selection
[FOA-1-C-1500-M4] N75-12636
Combined use of Tiros and DETEF systems for programming, data collection and evaluation of data output
[FOA-1-C-1474-C4] N75-12653
Nord data 72 at Helsinki, June 1972
[FOA-1-C-1496-M4] N75-12849

RICE UNIV., HOUSTON, TEX.
Transient and steady-state velocity of domain walls for a complete range of drive fields
[NASA-CR-140942] N75-12694
ULF measurements
[AD-785482] N75-12714

RIGA POLYTECHNICAL INST. [USSR].
Cybernetic methods in diagnostics
N75-12668

ROCHESTER APPLIED SCIENCE ASSOCIATES, INC., N.Y.
Development of an improved design tool for predicting and simulating helicopter rotor noise
[AD-785579] N75-11993
Investigation of viscous line vortices with and without the injection of core turbulence
[AD-785256] N75-12261

ROCHESTER UNIV., N.Y.
Fundamental studies in isotope chemistry
[COO-3498-15] N75-12075

ROCKETDYNE, CANOGA PARK, CALIF.
Space shuttle maneuvering engine reusable thrust chamber program. Task 11: Low epsilon stability test report data dump
[NASA-CR-140358] N75-12069

ROCKWELL INTERNATIONAL CORP., CANOGA PARK, CALIF.
A balloon-borne cryogenically cooled filter radiometer
N75-12745

ROCKWELL INTERNATIONAL CORP., COLUMBUS, OHIO.
Pilot model for aero propulsion test sled
[AD-785125] N75-12006
Environmental investigation of pilot propulsion test sled
[AD-785134] N75-12010

ROCKWELL INTERNATIONAL CORP., LOS ANGELES, CALIF.
Theoretical prediction of thick wing and pylon-fuselage-fanpod-nacelle aerodynamic characteristics at subcritical speeds. Part 1: Theory and results
[NASA-CR-137578] N75-11935
Theoretical prediction of thick wing and pylon-fuselage-fanpod-nacelle aerodynamic characteristics at subcritical speeds. Part 2: Computer program description
[NASA-CR-137579] N75-11936

ROME AIR DEVELOPMENT CENTER, GRIFFISS AFB, N.Y.
Laser backscatter characteristics of materials of interest in Ballistic Missile Defense [BMD]
[AD-785393] N75-12323

ROME UNIV. [ITALY].
Profile and contamination of an electron beam
[NP-20054] N75-12720

ROSENSTIEL SCHOOL OF MARINE AND ATMOSPHERIC SCIENCES, MIAMI, FLA.
Modelling geomagnetic polarity transitions
[AD-785255] N75-12480

ROYAL AIR FORCE, BINBROOK [ENGLAND].
The air defence role
N75-12602

ROYAL AIR FORCE INST. OF AVIATION MEDICINE, FARNBOROUGH [ENGLAND].
Evaluating measures of workload using a flight simulator
N75-12591
A flight simulator study of missile control performance as a function of concurrent workload
N75-12592

ROYAL AIR FORCE STRIKE COMMAND, HIGH WYCOMBE [ENGLAND].
Long range air-to-air refuelling: A study of duty and sleep patterns
N75-12600

ROYAL AIRCRAFT ESTABLISHMENT, FARNBOROUGH [ENGLAND].
The TAM-TAM system
[RAE-LIB-TRANS-1756] N75-11913
Liquid metal cooling of turbine blades
[RAE-LIB-TRANS-1713] N75-11977
Temperature measurements in wind tunnels
[RAE-LIB-TRANS-1736] N75-11998
The analysis and design of satellite stabilisation systems using ion propulsion
[RAE-LIB-TRANS-1775] N75-12027
High voltage supplies for electric thrusters
[RAE-LIB-TRANS-1773] N75-12062
The conception and realisation of sub-assemblies for the temperature control of a microthruster. Optimisation by development of a mathematical model
[RAE-LIB-TRANS-1757] N75-12067
Heat resistant titanium alloys. Introduction of the alloy UT 651A
[RAE-LIB-TRANS-1790] N75-12123
The alpha-beta titanium alloys. A comparison of the heat treatment and properties of the alloys: Ti-6Al-4V, Ti-6Al-6V-2Sn and Ti-6Al-6V-2Sn-6Zr
[RAE-LIB-TRANS-1797] N75-12125
Control of a transistor switch by current transformer
[RAE-LIB-TRANS-1774] N75-12196
The torques occurring in the starting of polyphase induction-motors with squirrel-cage rotors
[RAE-LIB-TRANS-1782] N75-12211
Low-pressure measurement by thermistor, and orifice-effect determination in rarefied gas flows
[RAE-LIB-TRANS-1734] N75-12224
Investigations into the creep and ageing behaviour of glued metal joints
[RAE-LIB-TRANS-1793] N75-12365
Complex psychophysiological evaluation of the readability of symbolic information
[RAE-LIB-TRANS-1777] N75-12575
Procedure for the isolation and determination of aldosterone in human urine by thin-film chromatography on polyamide and BTC micro-reaction
[RAE-LIB-TRANS-1778] N75-12579
Laboratory research into human information processing
N75-12590

ROYAL INST. OF TECH., STOCKHOLM [SWEDEN].
Mathematical models for some problems in water conservation
[PT-1972:7] N75-12387
Mathematical model describing the influence of biological and physical processes on the biological conditions in a sea
[PT-1972:5] N75-12538

S

SANDIA CORP., ALBUQUERQUE, N.MEX.
Comparison of some codes for the initial value prob'em for ordinary differential equations
[SLA-74-5319] N75-12681
Dynamic constitutive equations
[SLA-74-5438] N75-12682

SANDIA LABS., ALBUQUERQUE, N.MEX.
High pressure differential thermal analysis experiments with the LaNi5-H system
[SLA-74-5322] N75-12101
Comparison of the theoretical errors in the simultaneous measurement of round trip delay and Doppler frequency for several radar waveforms
[SLA-74-30] N75-12179
Field testing of a system for communication with commercial SNM shipments
[SLA-74-5431] N75-12181

Nonuniform grid method for turbulent boundary layers
[SAND-74-5023] N75-12253
Low contrast long latitude developer for high resolution plates and films
[SLA-74-97] N75-12292
Laser plasma studies with the Sandia four-beam system
[SLA-73-7064] N75-12304
Laser Doppler velocimetry in chemical laser studies
[SAND-74-5006] N75-12311
Soldering large area joints in vacuum
[SLA-73-1075] N75-12335
The 20,000-RPM centrifuge
[SLA-74-204] N75-12336
Fabrication of a conical composite stiffening rib
[SLA-74-277] N75-12370
MC2730 radioisotopic thermoelectric generator: A development report
[SLA-74-46] N75-12446
Conversion of boundary-value problems into stable initial-value problems via several invariant imbedding algorithms
[SAND-74-5018] N75-12644
Prime implicant algorithm with factoring
[SLA-74-218] N75-12645
User's guide for program ISOPLT to plot isotherms
[SLA-74-242] N75-12647
Effects of ionizing radiation on diffused resistors
[SLA-74-5148] N75-12717
Energy distributions of ions from a pulsed vacuum arc
[SLA-74-5034] N75-12795
Mars penetrator: Subsurface science mission
[NASA-CR-137587] N75-12878

SANDIA LABS., LIVERMORE, CALIF.
Analysis of flame emissions by laser Raman spectroscopy
[SLL-74-5244] N75-12105
Chemical milling
[SLL-74-5001] N75-12164
Calculation of incipient fracture at a shrink-fit pin interference
[SLL-73-63] N75-12367
Application software for electron microprobe analysis and data reduction
[SLL-74-5] N75-12642
Modified Gram Schmidt orthogonalization and its applications, including constrained least squares approximation
[SLL-74-200] N75-12683
QUICKE2: A one-dimensional code for calculating bulk and vacuum emitted photocompton currents
[SLL-74-218] N75-12817

SCHOOL OF AEROSPACE MEDICINE, BROOKS AFB, TEX.
Aircraft accident medical investigator's kit
[AD-785389] N75-12583
Systems simulation: A global approach to aircrew workload
N75-12588
Endocrine-metabolic indices of aircrew workload: An analysis across studies
N75-12596
Physiological costs of extended airborne command and control operations
N75-12603

SCIENTIFIC TRANSLATION SERVICE, SANTA BARBARA, CALIF.
Dust storms according to data of space research
[NASA-TT-F-16021] N75-12463

SCRIPPS INSTITUTION OF OCEANOGRAPHY, LA JOLLA, CALIF.
Marine physics: Internal-surface wave interaction
[AD-785262] N75-12540

SIEMENS A.G., KARLSRUHE [WEST GERMANY].
Basic research in scanning electron microscopy.
[BMFT-FB-T-74-09] N75-12289
Application of Auger electron spectroscopy to electron probe microanalysis
N75-12290
On the scanning electron microscopy of thin specimens in transmission
N75-12291

SMITHSONIAN ASTROPHYSICAL OBSERVATORY, CAMBRIDGE, MASS.
Stabilization, pointing and command control of a balloon-borne 1-meter telescope
N75-12756
Stellar content of the nuclei of elliptical galaxies determined from 2.3 micron CO band strengths
[NASA-CR-140859] N75-12861

SOCIETE NATIONALE INDUSTRIELLE AEROSPATIALE, PARIS [FRANCE].
Design and development of a momentum wheel with a mainly passive magnetic bearing, phase 1. Volume 2: Annexes
[ESRO-CR[P]-506] N75-12041
Momentum wheel - magnetic suspension losses by Eddy currents
N75-12042
Measurement of axial and radial stiffness
N75-12043
Ratio of axial and radial stiffness in an axisymmetric magnetic bearing
N75-12044
Study of repulsion bearings
N75-12045
Calculations on an elementary fluid damper
N75-12046
Foucault current damping tests
N75-12047
Theoretical study of system dynamics
N75-12048
Tests on axial velocity sensor
N75-12049
Principle of systems with Foucault current dissipation
N75-12050
Test apparatus for motor and magnetic bearing
N75-12051
Command electronics of the inertia wheel
N75-12052
Study of the axial actuator
N75-12053

SOUTH DAKOTA STATE UNIV., BROOKINGS.
Slow and fast motion of cracks in inelastic solids. Part 1: Slow growth of cracks in a rate sensitive tresca solid. Part 2: Dynamic crack represented by the Dugdale model
[NASA-CR-140803] N75-12354
Develop techniques and procedures, using multispectral systems, to identify from remotely sensed data the physical and thermal characteristics of plants and soil
[E75-10012] N75-12394
Develop techniques and procedures, using multispectral systems, to identify from remotely sensed data the physical and thermal characteristics of plants and soil
[E75-10033] N75-12403

SOUTHAMPTON UNIV. [ENGLAND].
A unified statistical model of the premixed turbulent flame
[AASU-335] N75-12094

SOUTHEASTERN MASSACHUSETTS UNIV., NORTH DARTMOUTH.
Preprocessing and feature extraction for automatic recognition of radar images
[AD-785427] N75-12186

SOUTHERN INTERSTATE NUCLEAR BOARD, ATLANTA, GA.
Radioactive shipments through our states: The weakest link?
[CONF-730588] N75-12860

SOUTHWEST RESEARCH INST., SAN ANTONIO, TEX.
Storage stability of federal specification gasolines
[AD-784282] N75-12160
United States Navy physiological telemetry system operation and maintenance manual
[AD-785273] N75-12619

SPERRY RAND CORP., GREAT NECK, N.Y.
Fiber coupled laser illuminator
[AD-785146] N75-12320

STANFORD RESEARCH INST., MENLO PARK, CALIF.
Dynamic molecular deflection
[AD-785407] N75-12718
Investigation of a photodichroic material for holographic storage and recovery
[AD-785274] N75-12768

STANFORD UNIV., CALIF.
Long range materials research
[AD-784962] N75-12140
Weakening of an elastic solid by a rectangular array of cracks
[AD-785436] N75-12379
Collaborative research in cardiovascular dynamics and bone elasticity
[NASA-CR-140997] N75-12572
A decomposition method for the solution of dual-angular integer programs
[AD-785568] N75-12651
Electronic structure of hard superconductors
[AD-785421] N75-12821
On the use of Godhavn H-component as an indicator of the interplanetary sector polarity
[NASA-CR-140858] N75-12867
The relationship between solar flares and solar sector boundaries
[NASA-CR-140856] N75-12882

STATE UNIV. OF NEW YORK, BINGHAMTON.
Absence of strangeness-changing, neutral current effects from the symmetric quark model
N75-12813

STATE UNIV. OF NEW YORK, BUFFALO.
Radar studies of bird migration
[NASA-CR-139802] N75-12544

STEVENS INST. OF TECH., HOBOKEN, N.J.
Investigations in plasma dynamics
[COO-3004-6] N75-12798

SUPREME HEADQUARTERS ALLIED POWERS EUROPE [SHAPE], CASTEAU [BELGIUM].
High workload tasks of aircrew in the tactical strike, attack and reconnaissance roles
N75-12601

SWEDISH STATE SHIPBUILDING EXPERIMENTAL TANK, GOTEBORG.
The cavitation laboratory of the Swedish state shipbuilding experimental tank
[CIRC-32] N75-12250

SYDNEY UNIV. [AUSTRALIA].
The airline minimum fleet problem
[AERO-TN-7403] N75-11909

SYSTEMS ASSOCIATES, INC., LONG BEACH, CALIF.
U. S. Army helicopter electrical system reliability and maintainability investigation. Volume 1: Document deficiency analysis
[AD-785573] N75-11961
U. S. Army helicopter electrical system reliability and maintainability investigation. Volume 2: Supplemental design guide
[AD-785574] N75-11962

SYSTEMS RESEARCH LAB., CHAMPAIGN, ILL.
Research study on stabilization and control modern sampled-data control theory. Design of the Large Space Telescope system
[NASA-CR-120534] N75-12669

T

TECHNICAL RESEARCH CENTRE OF FINLAND, HELSINKI.
Technology and community development materials processing, and electrical and nuclear technology
N75-12695

TECHNISCHE HOCHSCHULE, AACHEN [WEST GERMANY].
Short course on STOL aircraft technology and the community, volume 1
N75-11938
Short course on STOL aircraft technology and the community, volume 2
N75-11946
Noise of jets which are impinging on obstacles [for examples externally blown flaps] and possibilities of noise attenuation
N75-11951

TECHNISCHE HOCHSCHULE, HANOVER [WEST GERMANY].
The influence of heat treatment on a magnetogasdynamic flow
N75-12783

TECHNISCHE HOGESCHOOL, DELFT [NETHERLANDS].
The influence of frost formation and defrosting on the performance of air coolers
[WTHD-63] N75-12238

TECHNISCHE UNIVERSITAET, BRUNSWICK [WEST GERMANY].
Seminar on load calculations
[REPT-72-6] N75-12372

TECHNISCHE UNIVERSITAET, HANOVER [WEST GERMANY].
Optimization of carbon dioxide gas turbine loops
N75-11975
The viscosity of indium [3] halides
N75-12072
X-ray topographic study of crystal defects produced by diffusion of additive elements in single germanium crystals
N75-12089
Density and compressibility studies on homologous rows of ethers, ketones, dioles up to 4000 bar and 80 C
N75-12098
The effect of hafnium in unalloyed construction steels similar to St 52-3, considering especially the hot forming behavior of sulfidic inclusions
N75-12121
Absorption studies with pentanes for labeling pore structure and material transport in porous silica
N75-12145
Structural analysis on silicon after implantation of carbon ions in the energy region of 1 to 3 MeV
N75-12146
Erosive destruction by cavitation flow
N75-12237
The effect of stochastic interferences on the acoustic holographic imagery of objects
N75-12284
Measurements of gas component and duration time in the liquid phase of two and three component systems in bubble column reactors
N75-12285
Calculation of bearing loads and displacement paths in fast running high performance diesel engines at different point loads with emphasis on speed drop
N75-12332
Linear stabilization theory for curved rods
N75-12356
The mobility of the human arm: Motion analysis and possibilities of a simplified kinematical prosthetic system
N75-12551

TECHNISCHE UNIVERSITAET, MUNICH [WEST GERMANY].
Method for determining minority carrier life in epitaxial silscon layers summary
N75-12090
Studies on N2 fixation in transition metal complexes of chromium, molybdenum, and tungsten
N75-12118
Studies on non-crystalline iron halogenid layers by application of Mossbauer spectroscopy
N75-12119
Inhomogeneous oil spark paths at unipolar voltage load
N75-12197
Study of the turbulent torque flow in a cylindrical model apparatus
N75-12232
Contribution to the exact determination of the notch factor in screwed nut joints
N75-12327
Quantitative analysis of psychophysical stress in operating complex dynamic systems
N75-12606
Heart rate and sinusoidal arrythmia Measurement in view of objectivating concentration and stress in control tasks
N75-12608
Theoretical investigations on the coaxial accelerator with compression coil
N75-12782
Rotating plasma disk in stationary operation
N75-12784
Investigation on the plasma jet - Dipolar magnetic field interaction
N75-12786
The radial free flight arc
N75-12788
Mass and energy dependence of secondary electron emission from metals, studied for ions in 22 elements from lithium to lead
N75-12811
TECHNOLOGY SERVICE CORP., SANTA MONICA, CALIF.
Topics in the analysis and optimization of complex systems
[AD-785415] N75-12689
TECHNOLOGY SERVICE CORP.. SILVER SPRING, MD.
Studies of monochromatic, quasi-monochromatic and broadband imaging techniques: A generalized imaging integral
[AD-785269] N75-12770
TENNESSEE UNIV., KNOXVILLE.
The nu sub 2 band CHD3; ground state parameters for CHD3 from combination differences
[NASA-CR-140861] N75-12088
TENNESSEE UNIV. SPACE INST., TULLAHOMA.
Short course on STOL aircraft technology and the community, volume 1
N75-11938
Aerodynamics of high-lift devices
N75-11943
Air cushion landing systems for aircraft
N75-11944
Short course on STOL aircraft technology and the community, volume 2
N75-11946
Some results of aeroacoustic research
N75-11950
MHD energy conversion
[AD-785419] N75-12807
TEST GROUP [6585TH], HOLLOMAN AFB, N.MEX.
Radar signature measurements of BQM-34A and BQM-34F target drones, volume 1A
[AD-785219] N75-12182
TEXAS A&M UNIV., COLLEGE STATION.
Reduction and error analysis of the AVE 2 pilot experiment data
[NASA-CR-120496] N75-12531
A three parameter analytic phase function for multiple scattering calculations
[NASA-CR-140998] N75-12674
Obtaining initial vectors for minimizing the probability of misclassification
[NASA-CR-140348] N75-12675
TEXAS INSTRUMENTS, INC., DALLAS.
Monolithic laser
[AD-785021] N75-12325
TEXAS UNIV., AUSTIN.
Texas Biannual of Electronics Research No. 19
[AD-784968] N75-12218
Some basic properties of the payoffs defined by closed-loop strategies
[AD-784434] N75-12672
Generalization of domination structures and nondominated solutions in multicriteria decision making
[AD-784418] N75-12845
TEXAS UNIV., HOUSTON.
Remote sensing utility in a disaster struck urban environment
[NASA-CR-140801] N75-12858
TEXAS UNIV., SAN ANTONIO.
The control of the cardiovascular and central nervous system
[AD-784933] N75-12582
TOKYO UNIV. [JAPAN].
Hypersonic flow around blunt body at angles of attack
[ISAS-515-VOL-39-12] N75-12246
On master Boltzmann equation
[ISAS-516-VOL-39-13] N75-12678
Propagation of electron waves in a non-Maxwellian plasma
[ISAS-517-VOL-39-14] N75-12778
TORONTO UNIV. [ONTARIO].
A study of language directed computer design
[CSRG-20] N75-12623
Fabrication technology and materials
N75-12699
Optical probing of surface waves
N75-12703
Supersonic expansion of nonequilibrium plasmas
[AD-785434] N75-12804
TRW SYSTEMS GROUP, REDONDO BEACH, CALIF.
Department of defense space shuttle on-board software requirements
[AD-785123] N75-12648
Pioneer Jupiter/Saturn press reference
N75-12879

U

UNITED AIRCRAFT CORP., EAST HARTFORD, CONN.
Dye testing and evaluation program
[AD-784885] N75-12313
UNITED TECHNOLOGY CENTER, SUNNYVALE, CALIF.
High chamber pressure blast tube and nozzle material evaluation, volume 1
[AD-780531/0] N75-12071
UNIVERSITY COLL., LONDON [ENGLAND].
Astronomical observations with the University College London balloon borne telescope
N75-12738
Design and performance of a 39cm balloon-borne telescope
N75-12742
UNIVERSITY OF SOUTHERN CALIF., LOS ANGELES.
Characterization of self-focusing mechanisms in laser materials
[UCRL-13597] N75-12308
Optimum response simulation of multidegree systems by pulse excitation
[AD-783226] N75-12382

V

VARIAN ASSOCIATES, PALO ALTO, CALIF.
Airborne vapor surveillance system
[AD-785585] N75-12459
VEREINIGTE FLUGTECHNISCHE WERKE-FOKKER G.M.B.H., BREMEN [WEST GERMANY].
Vertical and short take-off demonstrated by the VAK 191 B
N75-11939
VIRGINIA POLYTECHNIC INST. AND STATE UNIV., BLACKSBURG.
Effect of interjet spacing on mixing of multiple coaxial jets in supersonic flow
[NASA-CR-2469] N75-12248
Analytical study of subsonic turbulent boundary layer separation including viscous-inviscid interaction
[NASA-CR-140958] N75-12254
VON KARMAN INST. FOR FLUID DYNAMICS, RHODE-SAINT-GENESE [BELGIUM].
Effect of shock impingement on heat transfer. Part 2: Effect of shear layer impingement on pressure and heat transfer rate distribution around a cylinder
[AD-778962] N75-12269

W

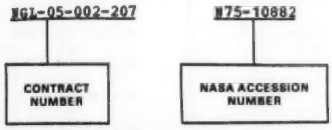
WASHINGTON UNIV., SEATTLE.
Repair of RNA
[RLO-2225-T-15-19] N75-12074
Determination of total body calcium [skeletal mass] in man by in vivo neutron activation analysis and total body counting
[TID-26613] N75-12581
WASHINGTON UNIV., ST. LOUIS, MO.
Sky survey at far infrared wavelengths using a balloon-borne telescope
N75-12750
A high sensitivity balloon-borne X-ray telescope system
N75-12754
WATERVLIET ARSENAL, N.Y.
Effect of loading rate on crack growth in glass-epoxy sheet
[AD-785519] N75-12149
Determination of contained functions in the modified-plane-wave method of band structure calculation
[AD-785515] N75-12823
WEAPONS RESEARCH ESTABLISHMENT, SALISBURY [AUSTRALIA].
Measurements of the basic atmospheric parameters at Woomera using the falling sphere, August to November 1973
[WRE-TN-1246[WR-D]] N75-12466
WEIDLINGER ASSOCIATES, NEW YORK.
Comparison of the results of the dynamic response of cylindrical shells by finite element methods: Axisymmetric case
[AD-785258] N75-12381
WESTERN GEAR CORP., LYNWOOD, CALIF.
Energy plantations: Should we grow trees for power plant fuel?
[VP-X-129] N75-12436
WESTINGHOUSE ASTRONUCLEAR LAB., PITTSBURGH, PA.
Modification and control of oxides structures on metals and alloys [phase 4]
[AD-785261] N75-12143
WHITTAKER CORP., SAN DIEGO, CALIF.
Manufacturing methods technology [MM and T] for ballistically tolerant replacement flight control components
[AD-785582] N75-12082
WITWATERSRAND UNIV., JOHANNESBURG [SOUTH AFRICA].
A computer programme for flowfield predictions in the interaction of a shock wave with a 90 degree bend
[REPT-58] N75-12640
WOLF RESEARCH AND DEVELOPMENT CORP., POCOMOKE CITY, MD.
Applicability of Skylab remote sensing for detection and monitoring of surface mining activities
[E75-10038] N75-12407
WOODS HOLE OCEANOGRAPHIC INSTITUTION, MASS.
New England Continental Shelf dynamics pilot experiment
[AD-785257] N75-12542
Advanced marine technology
[AD-784420] N75-12543
WRIGHT STATE UNIV., DAYTON, OHIO.
Visual information processing of complex imagery
[AD-785366] N75-12612

Y

YALE UNIV., NEW HAVEN, CONN.
Clustering of water on hydrated protons in a supersonic free jet expansion
[AD-785284] N75-12263
Moment characterization of a doubly-spread surface scatter channel at high and low Rayleigh parameters
[AD-785286] N75-12713

CONTRACT NUMBER INDEX

Typical Contract Number Index Listing



Listings in this index are arranged alphanumerically by contract number. Under each contract number, the NASA accession numbers denoting documents that have been produced as a result of research done under that contract are arranged in ascending order. The NASA accession number denotes the number by which the citation is identified.

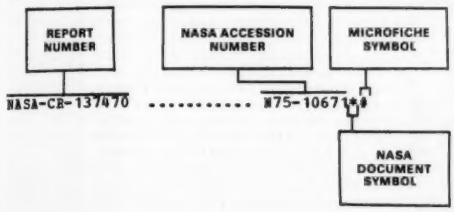
AF PROJ. C093
N75-11957
N75-11958
N75-11959
N75-11960
AF PROJ. 410A
N75-11955
AF PROJ. 589 N75-12006
AF PROJ. 649L
N75-12024
N75-12183
AF PROJ. 688G
N75-11916
AF PROJ. 698DF
N75-12187
AF PROJ. 1366
N75-12260
AF PROJ. 1425
N75-11956
AF PROJ. 1508A
N75-12189
AF PROJ. 2547
N75-11908
AF PROJ. 3048
N75-11967
AF PROJ. 3059
N75-12071
AF PROJ. 3066
N75-11987
AF PROJ. 4364
N75-12081
AF PROJ. 4751
N75-12218
AF PROJ. 6100
N75-12313
N75-12320
AF PROJ. 6430
N75-12004
AF PROJ. 6687
N75-12112
AF PROJ. 6813
N75-12613
N75-12710
N75-12807
N75-12821
N75-12822
AF PROJ. 7231
N75-11989
AF PROJ. 7233
N75-12612
AF PROJ. 7340
N75-12055
AF PROJ. 7360
N75-12113
AF PROJ. 7621
N75-12475
AF PROJ. 7660
N75-12866
AF PROJ. 9711
N75-11990
AF PROJ. 9749
N75-12687
N75-12689
AF PROJ. 9751
N75-12805
AF PROJ. 9752
N75-12807
N75-12808
AF PROJ. 9763
N75-12710
AF PROJ. 9764
N75-12821
N75-12822
N75-12824
N75-12825
AF PROJ. 9769
N75-12186
N75-12671
AF PROJ. 9777
N75-12582
AF PROJ. 9778
N75-11953
N75-12613
N75-12614
N75-12620
AF PROJ. 9781
N75-12268
N75-12295
AF PROJ. 9782
N75-12375
N75-12379
AF PROJ. 9783
N75-12021
AF-AFOSR-1760-69
N75-12375
AF-AFOSR-1905-70
N75-12379
AF-AFOSR-2008-71
N75-12382
AF-AFOSR-2028-71
N75-12824
AF-AFOSR-2074-71
N75-12582
AF-AFOSR-2077-71
N75-12710
AF-AFOSR-2119-71
N75-12186
AF-AFOSR-2147-71
N75-12269
AF-AFOSR-2226-72
N75-12805
AF-AFOSR-2249-72
N75-12821
AF-AFOSR-2274-72
N75-12804
AF-AFOSR-2292-72
N75-12822
AF-AFOSR-2317-72
N75-12739
AF-AFOSR-2328-72
N75-12687
AF-AFOSR-2341-72
N75-12825
AF-AFOSR-2365-72
N75-11990
AF-AFOSR-2406-72
N75-12536
AF-AFOSR-2492-73
N75-12671
AF-AFOSR-2509-73
N75-12295
AF-AFOSR-2577-74
N75-12268
ARPA ORDER 189-1
N75-12449
ARPA ORDER 293-008
N75-12543
ARPA ORDER 876
N75-12084
ARPA ORDER 1180
N75-12321
ARPA ORDER 1622
N75-12316
ARPA ORDER 1809
N75-12317
ARPA ORDER 1967
N75-12667
ARPA ORDER 2031
N75-12319
ARPA ORDER 2062
N75-12315
ARPA ORDER 2181
N75-12152
ARPA ORDER 2351
N75-12665
ARPA ORDER 2470
N75-12140
ARPA ORDER 2569
N75-12138
AT(04-3)-34 N75-12347
N75-12643
AT(04-3)-700 N75-12100
AT(10-1)-1375
N75-12641
AT(11-1)-1198
N75-12107
AT(11-1)-1407
N75-12474
AT(11-1)-2059
N75-12801
AT(11-1)-2118
N75-12664
N75-12670
N75-12692
AT(11-1)-2210
N75-12680
AT(11-1)-3004
N75-12798
AT(11-1)-3077
N75-12816
AT(11-1)-3231
N75-12549
AT(11-1)-3232
N75-12548
AT(11-1)-3498
N75-12075
AT(29-1)-789 N75-12105
N75-12164
N75-12179
N75-12292
N75-12335
N75-12336
N75-12367
N75-12370
N75-12446
N75-12642
N75-12645
N75-12647
N75-12683
N75-12717
N75-12817
N75-12878
AT(33-1)-GEN-53
N75-12444
AT(38-1)-810 N75-12547
AT(40-1)-4348
N75-12731
AT(45-1)-2130
N75-12163
AT(45-1)-2225
N75-12581
DA PROJ. 1F1-61102-A-35D
N75-12149
DA PROJ. 1F1-62203-A-119
N75-11961
N75-11962
DA PROJ. 1F1-62204-AA-43
N75-11993
DA PROJ. 1F1-62205-A-119
N75-11994
DA PROJ. 1G7-62713-A-034
N75-12621
DA PROJ. 1S7-62705-AH-94
N75-12111
N75-12712
DA PROJ. 1T0-61101-A-91A
N75-12259
DA PROJ. 1T0-61102-A-34A
N75-12451
DA PROJ. 1T0-62111-A-128
N75-12534
DA PROJ. 1T1-61101-A-91A
N75-12823
DA PROJ. 1T1-61102-A-33D
N75-11900
N75-12262
DA PROJ. 1T1-61102-A-34A
N75-12220
DA PROJ. 7X2-63304-D-215
N75-12688
DA-ABO(D)-31-124-71-G41
N75-12217
DAAB07-72-C-0259
N75-12214
N75-12216
DAAB07-72-C-2219
N75-12666
DAAD05-70-C-0197
N75-12459
DAAD05-71-C-0422
N75-12339
DAAD05-73-C-0555
N75-12450
DAAH01-73-C-0591
N75-12321
DAAH01-74-C-0131
N75-12714
DAAH03-74-C-0405
N75-11904
N75-11905
DAAJ02-72-C-0113
N75-12338
DAAJ02-72-C-0115
N75-12082
DAAJ02-73-C-0020
N75-11961
N75-11962
DAAJ02-73-C-0061
N75-11993
DAAJ02-73-C-0104
N75-11994
DAAJ02-74-C-0008
N75-11903
DAAK02-70-C-0181
N75-12818
DAAK02-73-C-0084
N75-12451
DAAK02-73-C-0221
N75-12160
DAAK02-73-C-0397
N75-11907
DACW72-70-C-0011
N75-12389
DACW72-71-C-0007
N75-12389
DACW72-72-C-0010
N75-12389
DAGW72-72-C-0002
N75-12389
DAHC04-69-C-0016
N75-12227
DAHC04-74-C-0034
N75-12651
DAHC15-71-C-0088
N75-12667
DAHC15-73-C-0181
N75-12449
DAHC15-73-G-15
N75-12140
DAHC15-73-0246
N75-12857
DAJA37-72-C-4116
N75-12826

DAJA37-73-C-1806 N75-12477
DARPA ORDER 1857 N75-12827
DASA01-70-C-0075 N75-12550
DASA01-71-C-0098 N75-12381
DGRST-71-7-2670 N75-12194
DGRST-71-7-2974 N75-12192
DGRST-72-7-0086 N75-12193
DNA PROJ. NWEP-ST99QAXS N75-12381
DOT-FA69WA-2066 N75-12009
DOT-FA70WA-2248 N75-11925
DOT-FA70WA-2448 N75-11917 N75-11919 N75-11923 N75-11924 N75-11926 N75-11927 N75-11928
DOT-FA73WA-3172 N75-11921
DOT-FA73WAI-346 N75-12604
DSR PROJ. 55-23890 N75-12038
ESTEC-2038/73-PP N75-12041
FAA PROJ. 052-241-026 N75-11921
FTD PROJ. T74-04-03 N75-12809
F04611-71-C-0051 N75-12071
F04611-72-C-0035 N75-12827
F04701-73-C-0074 N75-12267 N75-12481
F04701-74-C-0075 N75-12322
F04701-74-C-0316 N75-12648
F08606-73-C-0027 N75-12665
F19628-73-C-0001 N75-12004
F19628-73-C-0002 N75-12024 N75-12183 N75-12189 N75-12688
F19628-74-C-0078 N75-12475
F29601-71-C-0113 N75-12006
F29601-72-C-0131 N75-12010
F29601-73-C-0089 N75-11916
F30602-72-C-0438 N75-12184
F30602-72-C-0481 N75-12191
F30602-73-C-0310 N75-12293
F33615-67-C-1319 N75-12378
F33615-70-C-1298 N75-12081
F33615-71-C-1411 N75-11956
F33615-71-C-1457 N75-11988
F33615-72-C-1341 N75-12320
F33615-72-C-1610 N75-12055
F33615-72-C-1675 N75-12056 N75-12057
F33615-72-C-1682 N75-12350
F33615-72-C-1780 N75-12226
F33615-72-C-1996 N75-12187
F33615-72-C-2129 N75-12866
F33615-73-C-1149 N75-12313
F33615-73-C-2008 N75-11967
F33615-73-C-3010 N75-12260
F33615-73-C-4031 N75-12612
F33615-73-C-4081 N75-11957 N75-11958 N75-11959 N75-11960
F33615-73-C-5008 N75-12113
F33615-73-C-5012 N75-12166
F33615-74-C-4068 N75-11957 N75-11958 N75-11959 N75-11960
F33615-74-C-4160 N75-11989
F33657-70-C-1138 N75-11966
F33657-71-C-1168 N75-11902
F33657-72-C-0672 N75-12294
F40600-73-C-0006 N75-12265
F44620-69-C-0031 N75-12807
F44620-69-C-0104 N75-12021
F44620-70-C-0105 N75-11953 N75-12614 N75-12620
F44620-71-C-0089 N75-12718
F44620-71-C-0091 N75-12218
F44620-71-C-0093 N75-12689
F44620-72-C-0016 N75-12808
F44620-72-C-0019 N75-12613
F44620-72-C-0053 N75-12316
F44620-73-C-0011 N75-12771
F44620-74-C-0079 N75-12651
NASA ORDER H-2810-B N75-12401
NASA ORDER RA-88365-A N75-12878
NASA ORDER T-4105-B N75-12414
NASA ORDER T-4106-B N75-12402
NASA ORDER T-4713-B N75-12396
NASA ORDER T-4715-B N75-12400
NASA ORDER T-5290-B N75-12398
NASA ORDER T-6555-B N75-12413
NASA ORDER T-20541-G N75-12621
NASA ORDER T-43310-G N75-12574
NASW-2481 N75-11892 N75-12013 N75-12117
NASW-2483 N75-12463
NASW-2558 N75-12423
N75-12424 N75-12425
NAS1-10233 N75-12248
NAS1-11100 N75-11937
NAS1-11465 N75-12168 N75-12169 N75-12170
NAS1-12440 N75-11982
NAS2-5462 N75-11983
NAS2-6994 N75-11910
NAS2-7064 N75-12422
NAS2-7904 N75-11935 N75-11936
NAS3-14321 N75-11985
NAS3-16800 N75-12058 N75-12059
NAS3-17348 N75-11972
NAS3-17789 N75-12077
NAS3-17842 N75-11984
NAS5-11984 N75-12020
NAS5-20047 N75-12177
NAS5-21846 N75-12026
NAS7-100 N75-11997 N75-12028 N75-12064 N75-12171 N75-12276 N75-12429 N75-12433 N75-12652 N75-12734 N75-12869 N75-12870
NAS8-20765 N75-12198
NAS8-24000 N75-12011
NAS8-26751 N75-12531
NAS8-28723 N75-12016
NAS8-28725 N75-12015
NAS8-28734 N75-12017
NAS8-29583 N75-12529
NAS8-29853 N75-12669
NAS8-29940 N75-12208
NAS8-30216 N75-12546
NAS9-4065 N75-12038 N75-12345
NAS9-9784 N75-12417
NAS9-10509 N75-12871
NAS9-11905 N75-12618
NAS9-12200 N75-12025 N75-12279 N75-12419
NAS9-12692 N75-12842
NAS9-12749 N75-12580
NAS9-12802 N75-12069
NAS9-13114 N75-12420
NAS9-13247 N75-12022 N75-12029 N75-12030 N75-12031 N75-12032 N75-12033 N75-12034 N75-12035 N75-12040
NAS9-13272 N75-12391
NAS9-13273 N75-12405
NAS9-13275 N75-12408
NAS9-13280 N75-12409
NAS9-13283 N75-12399 N75-12404
NAS9-13303 N75-12393
NAS9-13308 N75-12411
NAS9-13310 N75-12407
NAS9-13313 N75-12395
NAS9-13317 N75-12392
NAS9-13337 N75-12394 N75-12403
NAS9-13343 N75-12406
NAS9-13364 N75-12397
NAS9-13380 N75-12390
NAS9-13394 N75-12410 N75-12412
NAS9-13524 N75-12199
NAS9-13550 N75-11999
NAS9-13616 N75-12630
NAS9-13654 N75-12278
NAS9-13710 N75-12036
NAS9-13894 N75-12675
NAS9-14077 N75-12418
NAS9-14103 N75-12631
NAS12-2207 N75-12437
NGL-05-002-207 N75-12861
NGL-05-020-223 N75-12572
NGL-24-005-160 N75-12622
NGL-24-005-263 N75-12421
NGL-31-001-005 N75-12775
NGL-33-010-070 N75-12364
NGL-36-003-138 N75-12201
NGL-43-001-006 N75-12088
NGL-44-084-003 N75-12858
NGR-03-002-371 N75-12737
NGR-05-002-256 N75-12872
NGR-05-003-559 N75-12812
NGR-05-003-562 N75-12120
NGR-05-003-598 N75-12865
NGR-05-007-337 N75-12359
NGR-05-020-559 N75-12867 N75-12882
NGR-19-011-013 N75-12464
NGR-22-007-270 N75-12740 N75-12756
NGR-22-009-701 N75-12585
NGR-22-009-735 N75-12617
NGR-23-004-085 N75-12228 N75-12229 N75-12230
NGR-23-005-417 N75-11929
NGR-26-008-069 N75-12750
NGR-31-001-109 N75-12060
NGR-31-001-307 N75-11974
NGR-33-183-003 N75-12544
NGR-34-002-175 N75-12115 N75-12116
NGR-36-009-017 N75-11911 N75-11912 N75-12209
NGR-39-007-066 N75-12353
NGR-39-011-113 N75-12473
NGR-42-003-006 N75-12354
NGR-44-001-117 N75-12674
NGR-44-006-001 N75-12694
NGR-47-004-119 N75-12254
NR PROJ. 031-716 N75-12142
NR PROJ. 031-734 N75-12137
NR PROJ. 036-097 N75-12374
NR PROJ. 047-021 N75-12672 N75-12845
NR PROJ. 047-061 N75-12651

NR PROJ. 083-060 N75-12480
NR PROJ. 098-038 N75-12257 N75-12263
NR PROJ. 177-941 N75-12615
NR PROJ. 211-159 N75-12188
NR PROJ. 215-203 N75-12772
NR PROJ. 215-220 N75-12325
NR PROJ. 260-105 N75-12540
NR PROJ. 356-484 N75-12084
NR PROJ. 359-451 N75-12083
NR PROJ. 371-016 N75-12219
NR PROJ. 372-305 N75-12819
NRL PROJ. M01-26 N75-12314
NRL PROJ. M01-30 N75-12135
NRL PROJ. R02-88 N75-12715
NRL PROJ. R07-23 N75-12711
NRL PROJ. R08-45 N75-12315
NRL PROJ. S02-19 N75-12215
NRL PROJ. 55N01-21 N75-12315
NRL PROJ. 63M01-30 N75-12136
NRL PROJ. 65N01-33 N75-12318
NRL PROJ. 77H02-288 N75-12802
NRL PROJ. 81501-30 N75-12150
NSF GA-30729X N75-12542
NSF GA-31138 N75-12867 N75-12882
NSF GA-41075 N75-12542
NSF GH-34584 N75-12694
NSF GJ-31521 N75-12651
NSF GK-33939 N75-12812
NSF GK-35798X N75-12205 N75-12242
NSF GP-35545X N75-12861
NSF GP-36687X N75-12872
N00014-67-A-0077-0012 N75-12137
N00014-67-A-0097-0031 N75-12713
N00014-67-A-0112-0058 N75-12651
N00014-67-A-0112-0068 N75-12867 N75-12882
N00014-67-A-0117-0014 N75-12151
N00014-67-A-0126-0008 N75-12672 N75-12845
N00014-67-A-0126-0009 N75-12672 N75-12845
N00014-67-A-0151-0029 N75-11992
N00014-67-A-0191-0026 N75-12650
N00014-67-A-0201-0013 N75-12480
N00014-67-A-0204-0002 N75-12258
N00014-67-A-0204-0048 N75-12542
N00014-67-A-0226-0005 N75-12257
N00014-67-A-0226-0006 N75-12263
N00014-67-A-0298-0005 N75-12219
N00014-67-A-0299-0017 N75-12819
N00014-67-A-0370-0008 N75-12374
N00014-67-A-0404-0006 N75-12083
N00014-67-C-0218 N75-12084
N00014-68-A-0112-0065 N75-12379
N00014-69-A-0200-1054 N75-12615 N75-12843
N00014-69-A-0200-6039 N75-12540
N00014-71-C-0226 N75-12261
N00014-71-C-0284 N75-12543
N00014-72-A-0027-0001 N75-12256
N00014-72-C-0260 N75-12768
N00014-73-C-0103 N75-12188
N00014-73-C-0206 N75-12619
N00014-73-C-0267 N75-12770
N00014-73-C-0288 N75-12325
N00014-73-C-0324 N75-12317
N00014-74-C-0056 N75-12054
N00014-74-C-0277 N75-12142
N00017-73-C-1418 N75-11991
N00019-70-C-0148 N75-12143
N00140-73-C-0005 N75-12341
N00140-74-C-0582 N75-11996
N62269-73-C-0361 N75-12143
PROJ. CPA-DF-03-26-1001 N75-12856
PROJ. RAND N75-12771
PROJ. SQUID N75-12263
RF21242102 N75-12109
RF41423001 N75-12325
RR014110 N75-12772
RR0110941 N75-12802
RR0220146 N75-12314
RR1310341 N75-12150
SRI PROJ. PYU-1301 N75-12718
SRI PROJ. 1777 N75-12768
SR009-01 N75-12258
SWRI PROJ. 13-3601 N75-12619
W-31-109-ENG-38 N75-12102 N75-12456 N75-12457 N75-12458
W-7405-ENG-26 N75-12134 N75-12305 N75-12366 N75-12721 N75-12727 N75-12730 N75-12815 N75-12886
W-7405-ENG-36 N75-12104 N75-12157 N75-12213 N75-12307 N75-12388 N75-12685
N75-12686 N75-12729 N75-12794 N75-12814 N75-12876 N75-12877
W-7405-ENG-48 N75-12132 N75-12133 N75-12251 N75-12310 N75-12625 N75-12662 N75-12725 N75-12726 N75-12765 N75-12766 N75-12767
W-7405-ENG-82 N75-12684
W-7504-ENG-26 N75-12369
WF41421210 N75-11954
XF11121100 N75-12215
XF21232015 N75-12715
ZF54544002 N75-12135 N75-12136
ZR0210501 N75-12185
ZR02302010 N75-12255
177-55-35-05 N75-12537
188-41-55-02 N75-12735
501-04 N75-11978
501-04-03-06 N75-12244
501-06-09-05 N75-12000
501-21 N75-12128
501-24 N75-11970 N75-12070 N75-12124 N75-12245 N75-12330
501-39-11-03 N75-12003
502-21-32-01 N75-12573
502-27-02-03 N75-12063
504-29-14-01 N75-11933
505-03 N75-12334
505-05-41-01 N75-12234
505-06-42-01 N75-12001
505-11-15-03 N75-12235
505-11-31-02 N75-12243
506-16 N75-12127
506-23 N75-12329
512-53-01-06 N75-11898
602-41-75-01 N75-12144
684-39-10-01 N75-12012
760-17-01-10 N75-11932
760-61-02-03 N75-11896
760-63-02-06 N75-11931
760-65-11-02 N75-11893
766-72 N75-11971

REPORT/ACCESSION NUMBER INDEX

Typical Report/Accession Number Index Listing



Listings in this index are arranged alphanumerically by report number. The NASA accession number denotes the number by which the citation is identified. An asterisk (*) indicates that the item is a NASA report. A pound sign (#) indicates that the item is available on microfiche. A plus sign (+) indicates a document that cannot be microfiched but for which one-to-one facsimile is available.

AAAF-NT-74-1 ..... N75-12225
AAAF-NT-74-2 ..... N75-12274

AASU-335 ..... N75-12094 #

AD-777564 ..... N75-12178 #
AD-778420 ..... N75-12481 #
AD-778443 ..... N75-12056 #
AD-778445 ..... N75-12057 #
AD-778824 ..... N75-11966 #
AD-778962 ..... N75-12269 #
AD-779352 ..... N75-12448 #
AD-779389 ..... N75-12339 #
AD-779456 ..... N75-12621*#
AD-779909 ..... N75-12769 #
AD-780531/0 ..... N75-12071 #
AD-780576/5 ..... N75-11988 #
AD-780596/3 ..... N75-12138 #
AD-780700/1 ..... N75-12851 #
AD-780935/3 ..... N75-12217 #
AD-781005/4 ..... N75-12341 #
AD-781010/4 ..... N75-12477 #
AD-781323/1 ..... N75-12626 #
AD-781373 ..... N75-12709 #
AD-781496/5 ..... N75-12259 #
AD-782662/1 ..... N75-12535 #
AD-782857/7 ..... N75-12338 #
AD-782978 ..... N75-12891 #
AD-783054 ..... N75-12803 #
AD-783087/0 ..... N75-12151 #
AD-783226 ..... N75-12382 #
AD-783830 ..... N75-12426 #
AD-784113 ..... N75-12337 #
AD-784231 ..... N75-12667 #
AD-784236 ..... N75-12451 #
AD-784271 ..... N75-11907 #
AD-784282 ..... N75-12160 #
AD-784415 ..... N75-12085 #
AD-784418 ..... N75-12845 #
AD-784420 ..... N75-12543 #
AD-784434 ..... N75-12672 #
AD-784473 ..... N75-12650 #
AD-784660 ..... N75-12826 #
AD-784760 ..... N75-12312 #
AD-784761 ..... N75-12373 #
AD-784814 ..... N75-12476 #
AD-784854 ..... N75-12004 #
AD-784866 ..... N75-12475 #
AD-784885 ..... N75-12313 #
AD-784889 ..... N75-11953 #
AD-784901 ..... N75-11987*#
AD-784912 ..... N75-12295 #
AD-784933 ..... N75-12582 #
AD-784947 ..... N75-12866 #
AD-784951 ..... N75-12665 #
AD-784952 ..... N75-12321 #
AD-784962 ..... N75-12140 #
AD-784964 ..... N75-12449 #
AD-784967 ..... N75-12808 #
AD-784968 ..... N75-12218 #
AD-784969 ..... N75-12054 #
AD-784972 ..... N75-12219 #
AD-784974 ..... N75-12383 #
AD-784975 ..... N75-11968 #
AD-784977 ..... N75-12772 #
AD-784982 ..... N75-12185 #
AD-784991 ..... N75-12319 #
AD-784995 ..... N75-12318 #
AD-784999 ..... N75-12461 #
AD-785000 ..... N75-11965 #
AD-785002 ..... N75-12843 #
AD-785003 ..... N75-12615 #
AD-785005 ..... N75-12109 #
AD-785007 ..... N75-12190 #
AD-785008 ..... N75-12150 #
AD-785009 ..... N75-12136 #
AD-785010 ..... N75-12314 #
AD-785011 ..... N75-12711 #
AD-785012 ..... N75-12215 #
AD-785013 ..... N75-12715 #
AD-785014 ..... N75-12818 #
AD-785020 ..... N75-12142 #
AD-785021 ..... N75-12325 #
AD-785023 ..... N75-11919 #
AD-785025 ..... N75-12009 #
AD-785028 ..... N75-11992 #
AD-785034 ..... N75-12141 #
AD-785078 ..... N75-12819 #
AD-785080 ..... N75-12188 #
AD-785083 ..... N75-12267 #
AD-785084 ..... N75-12857 #
AD-785101 ..... N75-11957 #
AD-785102 ..... N75-11958 #
AD-785103 ..... N75-11959 #
AD-785104 ..... N75-11960 #
AD-785106 ..... N75-12533 #
AD-785108 ..... N75-12806 #
AD-785110 ..... N75-12478 #
AD-785113 ..... N75-12266 #
AD-785114 ..... N75-12479 #
AD-785115 ..... N75-12809 #
AD-785116 ..... N75-12376 #
AD-785119 ..... N75-12184 #
AD-785121 ..... N75-12771 #
AD-785123 ..... N75-12648 #
AD-785124 ..... N75-12191 #
AD-785125 ..... N75-12006 #
AD-785127 ..... N75-12852 #
AD-785128 ..... N75-12627 #
AD-785131 ..... N75-12221 #
AD-785133 ..... N75-12773 #
AD-785134 ..... N75-12010 #
AD-785136 ..... N75-12113 #
AD-785138 ..... N75-12189 #
AD-785139 ..... N75-12350 #
AD-785144 ..... N75-11967 #
AD-785145 ..... N75-11956 #
AD-785146 ..... N75-12320 #
AD-785154 ..... N75-11901 #
AD-785180 ..... N75-12317 #
AD-785190 ..... N75-12820 #
AD-785193 ..... N75-12380 #
AD-785195 ..... N75-11902 #
AD-785196 ..... N75-11955 #
AD-785202 ..... N75-12584 #
AD-785205 ..... N75-12110 #
AD-785206 ..... N75-12460 #
AD-785209 ..... N75-12349 #
AD-785212 ..... N75-12114 #
AD-785218 ..... N75-12649 #
AD-785219 ..... N75-12182 #
AD-785220 ..... N75-12005 #
AD-785229 ..... N75-12340 #
AD-785230 ..... N75-11954 #
AD-785231 ..... N75-12158 #
AD-785232 ..... N75-12159 #
AD-785233 ..... N75-12135 #

AD-785234 ..... N75-12315 #
AD-785238 ..... N75-12802 #
AD-785239 ..... N75-12255 #
AD-785242 ..... N75-12256 #
AD-785245 ..... N75-12541 #
AD-785246 ..... N75-11986 #
AD-785249 ..... N75-12374 #
AD-785255 ..... N75-12480 #
AD-785256 ..... N75-12261 #
AD-785257 ..... N75-12542 #
AD-785258 ..... N75-12381 #
AD-785259 ..... N75-12550 #
AD-785261 ..... N75-12143 #
AD-785262 ..... N75-12540 #
AD-785263 ..... N75-12083 #
AD-785265 ..... N75-11996 #
AD-785266 ..... N75-12084 #
AD-785267 ..... N75-12137 #
AD-785269 ..... N75-12770 #
AD-785271 ..... N75-12258 #
AD-785273 ..... N75-12619 #
AD-785274 ..... N75-12768 #
AD-785276 ..... N75-11991 #
AD-785283 ..... N75-12257 #
AD-785284 ..... N75-12263 #
AD-785286 ..... N75-12713 #
AD-785308 ..... N75-11928 #
AD-785309 ..... N75-11926 #
AD-785310 ..... N75-11927 #
AD-785311 ..... N75-11925 #
AD-785312 ..... N75-11923 #
AD-785313 ..... N75-11924 #
AD-785319 ..... N75-12007 #
AD-785320 ..... N75-12604*#
AD-785334 ..... N75-11917 #
AD-785335 ..... N75-11921 #
AD-785338 ..... N75-11920 #
AD-785346 ..... N75-11908 #
AD-785347 ..... N75-12112 #
AD-785348 ..... N75-12264 #
AD-785349 ..... N75-12008 #
AD-785350 ..... N75-12846 #
AD-785351 ..... N75-12265 #
AD-785352 ..... N75-12324 #
AD-785353 ..... N75-12377 #
AD-785358 ..... N75-12166 #
AD-785360 ..... N75-11989 #
AD-785362 ..... N75-12081 #
AD-785366 ..... N75-12612 #
AD-785367 ..... N75-12614 #
AD-785368 ..... N75-12620 #
AD-785369 ..... N75-12260 #
AD-785370 ..... N75-11916 #
AD-785374 ..... N75-12378 #
AD-785379 ..... N75-12688 #
AD-785380 ..... N75-12024 #
AD-785381 ..... N75-12183 #
AD-785388 ..... N75-12021 #
AD-785389 ..... N75-12583 #
AD-785390 ..... N75-11915 #
AD-785391 ..... N75-11918 #
AD-785392 ..... N75-11922 #
AD-785393 ..... N75-12323 #
AD-785394 ..... N75-12268 #
AD-785395 ..... N75-12536 #
AD-785396 ..... N75-12293 #
AD-785398 ..... N75-12187 #
AD-785399 ..... N75-12294 #
AD-785400 ..... N75-12322 #
AD-785401 ..... N75-12316 #
AD-785404 ..... N75-12805 #
AD-785405 ..... N75-12671 #
AD-785407 ..... N75-12718 #
AD-785409 ..... N75-12139 #
AD-785411 ..... N75-12613 #
AD-785412 ..... N75-12827 #
AD-785415 ..... N75-12689 #
AD-785419 ..... N75-12807 #
AD-785421 ..... N75-12821 #
AD-785424 ..... N75-12822 #
AD-785425 ..... N75-12687 #
AD-785426 ..... N75-12824 #
AD-785427 ..... N75-12186 #
AD-785429 ..... N75-12710 #
AD-785433 ..... N75-12375 #
AD-785434 ..... N75-12804 #
AD-785436 ..... N75-12379 #
AD-785441 ..... N75-12854 #
AD-785442 ..... N75-12844 #
AD-785443 ..... N75-11914 #
AD-785444 ..... N75-11995 #
AD-785482 ..... N75-12714 #
AD-785484 ..... N75-12825 #
AD-785485 ..... N75-11990 #
AD-785497 ..... N75-12691 #
AD-785502 ..... N75-11963 #
AD-785503 ..... N75-12351 #
AD-785511 ..... N75-12111 #
AD-785512 ..... N75-12712 #
AD-785515 ..... N75-12823 #
AD-785519 ..... N75-12149 #
AD-785520 ..... N75-11900 #
AD-785522 ..... N75-12262 #
AD-785531 ..... N75-12534 #
AD-785534 ..... N75-12220 #
AD-785540 ..... N75-12342 #
AD-785547 ..... N75-12152 #
AD-785553 ..... N75-11964 #
AD-785554 ..... N75-11906 #
AD-785565 ..... N75-11904 #
AD-785566 ..... N75-11905 #
AD-785568 ..... N75-12651 #
AD-785569 ..... N75-12214 #
AD-785570 ..... N75-12666 #
AD-785571 ..... N75-12216 #
AD-785572 ..... N75-12389 #
AD-785573 ..... N75-11961 #
AD-785574 ..... N75-11962 #
AD-785579 ..... N75-11993 #
AD-785580 ..... N75-11994 #
AD-785581 ..... N75-11903 #
AD-785582 ..... N75-12082 #
AD-785584 ..... N75-12450 #
AD-785585 ..... N75-12459 #
AD-785586 ..... N75-12055 #

AEDC-TR-74-38 ..... N75-12264 #
AEDC-TR-74-39 ..... N75-12112 #
AEDC-TR-74-56 ..... N75-12324 #
AEDC-TR-74-65 ..... N75-12008 #
AEDC-TR-74-78 ..... N75-11908 #
AEDC-TR-74-79 ..... N75-12265 #

AERO-TN-7403 ..... N75-11909 #

AERO-1197 ..... N75-11954 #

AFAL-TR-73-447 ..... N75-12866 #
AFAL-TR-74-67 ..... N75-12313 #
AFAL-TR-74-114-VOL-2 ..... N75-12187 #
AFAL-TR-74-185 ..... N75-12320 #

AFAPL-TR-73-79-VOL-5 ..... N75-11988 #
AFAPL-TR-73-116 ..... N75-11987*#
AFAPL-TR-74-17 ..... N75-11967 #

AFCEC-TR-74-4 ..... N75-12007 #

AFCRL-TR-74-0349 ..... N75-12475 #

AFETR-TR-74-01 ..... N75-12649 #

AFFDL-TR-73-47 ..... N75-11956 #
AFFDL-TR-73-115 ..... N75-12081 #
AFFDL-TR-73-159-VOL-1 ..... N75-12056 #
AFFDL-TR-73-159-VOL-3 ..... N75-12057 #
AFFDL-TR-74-5 ..... N75-11955 #
AFFDL-TR-74-19 ..... N75-12260 #
AFFDL-TR-74-36 ..... N75-12378 #

AFHRL-TR-74-20(2) ..... N75-12350 #

AFL-74-7-13 ..... N75-12256 #

AFLRL-34 ..... N75-12160 #

AFML-TR-74-57 ..... N75-12113 #
AFML-TR-74-87 ..... N75-12166 #
AFML-TR-74-128 ..... N75-12055 #

AFOSR-74-0795TR ..... N75-12268 #
AFOSR-74-1195TR ..... N75-12382 #
AFOSR-74-1298TR ..... N75-12808 #
AFOSR-74-1336TR ..... N75-12582 #
AFOSR-74-1343TR ..... N75-12295 #
AFOSR-74-1351TR ..... N75-11953 #
AFOSR-74-1371TR ..... N75-12825 #
AFOSR-74-1372TR ..... N75-12613 #

AFOSR-74-1373TR ..... N75-12805 #
AFOSR-74-1374TR ..... N75-12821 #
AFOSR-74-1375TR ..... N75-12824 #
AFOSR-74-1377TR ..... N75-12822 #
AFOSR-74-1378TR ..... N75-12710 #
AFOSR-74-1379TR ..... N75-12375 #
AFOSR-74-1380TR ..... N75-12718 #
AFOSR-74-1410TR ..... N75-12689 #
AFOSR-74-1412TR ..... N75-12687 #
AFOSR-74-1415TR ..... N75-12186 #
AFOSR-74-1424TR ..... N75-12536 #
AFOSR-74-1425TR ..... N75-12218 #
AFOSR-74-1438TR ..... N75-11990 #
AFOSR-74-1440TR ..... N75-12316 #
AFOSR-74-1445TR ..... N75-12614 #
AFOSR-74-1446TR ..... N75-12620 #
AFOSR-74-1447TR ..... N75-12379 #
AFOSR-74-1450TR ..... N75-12671 #
AFOSR-74-1501TR ..... N75-12804 #
AFOSR-74-1503TR ..... N75-12807 #
AFOSR-74-1505TR ..... N75-12021 #

AFRPL-TR-73-60-VOL-1 ..... N75-12071 #
AFRPL-TR-74-30 ..... N75-12827 #

AFSWC-TR-72-6 ..... N75-12006 #
AFSWC-TR-73-6 ..... N75-12010 #
AFSWC-TR-74-01-VOL-1A ..... N75-12182 #
AFSWC-TR-74-23 ..... N75-11916 #

AGARD-CP-105 ..... N75-11913 #
AGARD-CP-146 ..... N75-12587 #

AGARD-INDEX-52/70 ..... N75-12847 #

AGARD-LS-70 ..... N75-12357 #

AGMC-74-010II ..... N75-11915 #
AGMC-74-012II ..... N75-11918 #
AGMC-74-014II ..... N75-11922 #

AIRESEARCH-73-210285-5 ..... N75-11988 #

AMCP-706-115 ..... N75-12461 #
AMCP-706-204 ..... N75-11965 #

AMHRC-MS-74-7 ..... N75-12152 #

AMRL-TR-73-108 ..... N75-11989 #
AMRL-TR-74-43 ..... N75-12612 #

ANCR-1153 ..... N75-12641 #

ANL-CT-74-16 ..... N75-12371 #

ANL-TRANS-952 ..... N75-12722 #

ANL-8095 ..... N75-12102 #

ANL/ES-18 ..... N75-12456 #
ANL/ES-29 ..... N75-12458 #
ANL/ES-32 ..... N75-12457 #

AOEL-62 ..... N75-12540 #

AR-1 ..... N75-11974*#
AR-3 ..... N75-11992 #

AREAEE-177 ..... N75-12212 #

ARH-3020 ..... N75-12163 #

ARL-74-2/AFOSR-74-1 ..... N75-12614 #
ARL-74-6/AFOSR-74-4 ..... N75-12620 #

ARL/ME-NOTE-347 ..... N75-11976 #
ARL/MET-REPT-93 ..... N75-12078 #
ARL/73-23/AFOSR-73-14 ..... N75-11953 #

ARO-PWT-TR-74-45 ..... N75-12008 #

ARO-VKF-TR-74-8 ..... N75-12264 #
ARO-VKF-TR-74-14 ..... N75-12112 #
ARO-VKF-TR-74-48 ..... N75-11908 #

AROD-9283.4-EL ..... N75-12217 #
AROD-12215-1-M ..... N75-12651 #

ASD-TR-71-41-VOL-2 ..... N75-11966 #

ASD-TR-74-26 ..... N75-11902 #

ASD/XR-74-17-VOL-1 ..... N75-11957 #
ASD/XR-74-17-VOL-2 ..... N75-11958 #
ASD/XR-74-17-VOL-3 ..... N75-11959 #
ASD/XR-74-17-VOL-4 ..... N75-11960 #

ASR-74-302 ..... N75-12069*#

ATL-TR-191 ..... N75-12260 #

AV-HLS-74-1 ..... N75-12005 #

AVSD-0292-74-RR ..... N75-12199*#

BAC-8654-953005 ..... N75-12058*#
BAC-8654-953005-APP ..... N75-12059*#

BBC-RD-1974/33 ..... N75-12167
BBC-RD-1974/34 ..... N75-12733

BBN-2582 ..... N75-11989 #
BBN-2852 ..... N75-12665 #
BBN-2869 ..... N75-12667 #

BDX-613-1138 ..... N75-12348 #

BMFT-FB-T-74-09 ..... N75-12289 #

BMPR-14 ..... N75-12402*#

BNL-18651 ..... N75-12441 #
BNL-18866 ..... N75-12443 #
BNL-18887 ..... N75-12440 #

BRL-MR-2395 ..... N75-11900 #

BRL-1714 ..... N75-12259 #
BRL-1727 ..... N75-12262 #

BR8073 ..... N75-12054 #
BR42248 ..... N75-12067 #
BR42249 ..... N75-11913 #
BR42314 ..... N75-12062 #
BR42365 ..... N75-12027 #
BR42366 ..... N75-12196 #
BR42767 ..... N75-11998 #
BR43697 ..... N75-12211 #
BR43698 ..... N75-12365 #
BR43708 ..... N75-12579 #
BR43709 ..... N75-12224 #
BR44130 ..... N75-12575 #
BR44131 ..... N75-12125 #
BR44153 ..... N75-12123 #
BR44233 ..... N75-11977 #

BULL-93 ..... N75-12231 #

CAI-2405-A012-1 ..... N75-12294 #

CEA-CONF-2580 ..... N75-11899 #
CEA-CONF-2584 ..... N75-12180 #

CEA-N-1684 ..... N75-12079 #

CEA-R-4492 ..... N75-12099 #
CEA-R-4511 ..... N75-12346 #
CEA-R-4540 ..... N75-12707 #
CEA-R-4542 ..... N75-12131 #
CEA-R-4561 ..... N75-12679 #
CEA-R-4567 ..... N75-12130 #

CERC-TM-44 ..... N75-12389 #

CIRC-32 ..... N75-12250 #

CMR-74-6 ..... N75-12140 #

CONF-730588 ..... N75-12860 #
CONF-731009-9 ..... N75-12302 #
CONF-731068-2 ..... N75-12850 #
CONF-731068-3 ..... N75-12165 #
CONF-731138-4 ..... N75-11899 #
CONF-731147-1 ..... N75-12643 #
CONF-740103-4 ..... N75-12080 #
CONF-740216-2 ..... N75-12157 #
CONF-740231-3 ..... N75-12074 #
CONF-740321-2 ..... N75-12106 #
CONF-740321-3 ..... N75-12881 #

CONF-740335 ..... N75-12445 #
CONF-740337-1 ..... N75-12311 #
CONF-740402-41 ..... N75-12303 #
CONF-740407-4 ..... N75-12441 #
CONF-740454-1 ..... N75-12685 #
CONF-740509-6 ..... N75-12213 #
CONF-740509-7 ..... N75-12814 #
CONF-740512-10 ..... N75-12661 #
CONF-740512-11 ..... N75-12646 #
CONF-740524-2 ..... N75-12305 #
CONF-740533-2 ..... N75-12348 #
CONF-740536-1 ..... N75-12105 #
CONF-740543-1 ..... N75-12440 #
CONF-740608-11 ..... N75-12181 #
CONF-740617-3 ..... N75-12309 #
CONF-740617-4 ..... N75-12304 #
CONF-740623-1 ..... N75-12681 #
CONF-740624-1 ..... N75-12682 #
CONF-740625-1 ..... N75-12253 #
CONF-740627-1 ..... N75-12644 #
CONF-740628-2 ..... N75-12888 #
CONF-740634-1 ..... N75-12101 #
CONF-740641-1 ..... N75-12447 #
CONF-740643-1 ..... N75-12876 #
CONF-740649-1 ..... N75-12347 #
CONF-740767-8 ..... N75-12717 #
CONF-740710-1 ..... N75-12686 #
CONF-740716-2 ..... N75-12795 #
CONF-740803-2 ..... N75-12766 #
CONF-740803-3 ..... N75-12765 #
CONF-740805-1 ..... N75-12252 #

COO-1198-1075 ..... N75-12107 #
COO-1407-52 ..... N75-12474 #
COO-2007-45 ..... N75-12306 #
COO-2059-37 ..... N75-12801 #
COO-2271-28 ..... N75-12693 #
COO-2271-34 ..... N75-12828 #
COO-3004-6 ..... N75-12798 #
COO-3071-95 ..... N75-12864 #
COO-3077-53 ..... N75-12816 #
COO-3151-38 ..... N75-12708 #
COO-3231-2 ..... N75-12549 #
COO-3232-3 ..... N75-12548 #
COO-3429-19 ..... N75-12076 #
COO-3429-20 ..... N75-12108 #
COO-3498-15 ..... N75-12075 #

CRC-1253 ..... N75-12363 #
CRC-1260 ..... N75-12696 #
CRC-1261 ..... N75-12174 #

CS-178 ..... N75-12672 #
CS-185 ..... N75-12845 #

CSRG-20 ..... N75-12623 #

CW-WR-73-040 ..... N75-12338 #

DDA-EDR-7968 ..... N75-12341 #

DDC-TAS-74-20 ..... N75-12851 #
DDC-TAS-74-29 ..... N75-12846 #

DLR-FB-71-108 ..... N75-11892*#

DLR-MITT-72-27 ..... N75-11998 #
DLR-MITT-74-19 ..... N75-12605 #
DLR-MITT-74-20 ..... N75-12779 #

DMS-AR-1011-VOL-1 ..... N75-11904 #
DMS-AR-1011-VOL-2 ..... N75-11905 #

DMS-DR-2057 ..... N75-12033*#
DMS-DR-2074 ..... N75-12040*#
DMS-DR-2080-VOL-1 ..... N75-12034*#
DMS-DR-2111 ..... N75-12022*#
DMS-DR-2112 ..... N75-12029*#
DMS-DR-2144 ..... N75-12030*#
DMS-DR-2162 ..... N75-12031*#
DMS-DR-2181 ..... N75-12032*#
DMS-DR-2187 ..... N75-12035*#

DNA-3312F ..... N75-12381 #
DNA-3314F ..... N75-12550 #

DPG-FR-M600P ..... N75-12534 #

DRDA-036390-3-F ..... N75-11929*#

DREO-TN-74-18 ..... N75-12467 #

DREV-R-710/74 ..... N75-12301 #

DSL-TN-334 ..... N75-12764 #
DSL-TN-339 ..... N75-12093 #
DSL-TN-345 ..... N75-12147 #
DSL-TN-388 ..... N75-12092 #

DSL-546 ..... N75-12155 #
DSL-551 ..... N75-12331 #
DSL-600 ..... N75-12097 #

D3-8686 ..... N75-11985*#
D6-41805 ..... N75-11984*#
D180-17875-1 ..... N75-11999*#

E-7545 ..... N75-12245*#
E-7808 ..... N75-11971*#
E-7875 ..... N75-12330*#
E-7992 ..... N75-11970*#
E-7994 ..... N75-12124*#
E-7999 ..... N75-11978*#
E-8019 ..... N75-12128*#
E-8066 ..... N75-12070*#
E-8082 ..... N75-12334*#
E-8083 ..... N75-12127*#
E-8116 ..... N75-12329*#

ECOM-4236 ..... N75-12111 #
ECOM-4242 ..... N75-12712 #

ED-2002-1744 ..... N75-12011*#

EER-5-19 ..... N75-12009 #

ENVPREDRSCHF-TECH-PAPER-1 ..... N75-12541 #

EO-126 ..... N75-12419*#

EOD2876 ..... N75-12279*#

ERC-2597-S-3 ..... N75-12451 #

ERIM-101300-18-F ..... N75-12321 #
ERIM-101700-17-L ..... N75-12391*#
ERIM-101900-42-L ..... N75-12409*#
ERIM-102000-27-L ..... N75-12392*#
ERIM-102300-8-L ..... N75-12408*#
ERIM-103300-35-L ..... N75-12399*#
ERIM-103300-37-L ..... N75-12404*#
ERIM-190100-30-T ..... N75-12417*#
ERIM-193900-10-F-VOL-2 ..... N75-12187 #

ERO-1449 ..... N75-12826 #

ES-3 ..... N75-12535 #

ESD-TR-74-184 ..... N75-12004 #
ESD-TR-74-227 ..... N75-12189 #
ESD-TR-74-244 ..... N75-12688 #
ESD-TR-74-278 ..... N75-12024 #
ESD-TR-74-279 ..... N75-12183 #

ESDU-04.01.01-AMEND-A ..... N75-12352 #
ESDU-74020-PT-2 ..... N75-12673 #
ESDU-74028 ..... N75-12223 #

ESL-SR-132 ..... N75-12418*#

ESL-TN-456 ..... N75-12422*#

ESRO-CR(P)-506 ..... N75-12041 #

EUR-CEA-FC-711 ..... N75-12793 #

EUR-5125 ..... N75-12103 #

E75-10002 ..... N75-12390*#
E75-10006 ..... N75-12391*#
E75-10008 ..... N75-12392*#
E75-10010 ..... N75-12393*#
E75-10012 ..... N75-12394*#
E75-10014 ..... N75-12395*#
E75-10017 ..... N75-12396*#
E75-10018 ..... N75-12397*#
E75-10019 ..... N75-12398*#
E75-10020 ..... N75-12399*#

E75-10021 ..... N75-12400*#
E75-10030 ..... N75-12401*#
E75-10032 ..... N75-12402*#
E75-10033 ..... N75-12403*#
E75-10034 ..... N75-12404*#
E75-10035 ..... N75-12405*#
E75-10036 ..... N75-12406*#
E75-10038 ..... N75-12407*#
E75-10039 ..... N75-12408*#
E75-10040 ..... N75-12409*#
E75-10041 ..... N75-12410*#
E75-10042 ..... N75-12411*#
E75-10043 ..... N75-12412*#
E75-10045 ..... N75-12413*#
E75-10046 ..... N75-12414*#
E75-10047 ..... N75-12415*#

FAA-AM-73-13 ..... N75-12178 #

FAA-EM-73-10A ..... N75-11919 #
FAA-EM-73-10A-SER-3 ..... N75-11928 #
FAA-EM-73-10A-SER-4-VOL-1 ..... N75-11926 #
FAA-EM-73-10A-SER-4-VOL-2 ..... N75-11927 #
FAA-EM-73-10A-SER-5 ..... N75-11925 #
FAA-EM-73-10A-SER-6 ..... N75-11917 #
FAA-EM-73-10A-SER-7 ..... N75-11923 #
FAA-EM-73-10A-SER-8 ..... N75-11924 #

FAA-RD-73-170 ..... N75-12604*#
FAA-RD-74-94 ..... N75-12009 #
FAA-RD-74-117 ..... N75-11921 #
FAA-RD-74-121 ..... N75-12005 #

FIBL-P3120-10 ..... N75-12339 #

FL-190 ..... N75-12621*#

FOA-C-20010-T1 ..... N75-12465 #
FOA-C-20018-T1 ..... N75-12470 #

FOA-P-C-8339-M3 ..... N75-12853 #
FOA-P-C-8347-M5 ..... N75-11981 #
FOA-P-C-8349-M1 ..... N75-12890 #
FOA-P-C-8350-M3(E5) ..... N75-12655 #
FOA-P-C-8351-M7 ..... N75-12528 #
FOA-P-C-8353-M3(E5) ..... N75-12634 #
FOA-P-C-8355-M3(E5) ..... N75-12635 #
FOA-P-C-8359-M3(E5) ..... N75-12639 #
FOA-P-C-8360-M7 ..... N75-12654 #
FOA-P-C-8361-M3 ..... N75-12638 #
FOA-P-C-8362-M7 ..... N75-12297 #

FOA-1-A-1561-H3 ..... N75-12453 #
FOA-1-A-1562-F5 ..... N75-12023 #
FOA-1-C-1469-H3 ..... N75-12454 #
FOA-1-C-1470-C4 ..... N75-12633 #
FOA-1-C-1471-D3 ..... N75-12068 #
FOA-1-C-1474-C4 ..... N75-12653 #
FOA-1-C-1478-M4 ..... N75-12545 #
FOA-1-C-1488-D3 ..... N75-12154 #
FOA-1-C-1489-C4 ..... N75-12096 #
FOA-1-C-1492-H3 ..... N75-12455 #
FOA-1-C-1493-G3(G1) ..... N75-12129 #
FOA-1-C-1496-M4 ..... N75-12849 #
FOA-1-C-1497-D1 ..... N75-12288 #
FOA-1-C-1498-C3(H6) ..... N75-12247 #
FOA-1-C-1500-M4 ..... N75-12636 #
FOA-1-C-1503-M4(H5-H6) ..... N75-12530 #
FOA-1-C-1504-M4(H5-H6) ..... N75-12624 #
FOA-1-C-1507-C2(C4) ..... N75-12659 #
FOA-1-C-1515-H3 ..... N75-12073 #
FOA-2-A-2562-E4 ..... N75-12282 #
FOA-2-A-2564-D8 ..... N75-11894 #
FOA-2-A-2566-F8(F3) ..... N75-11897 #
FOA-2-A-2568-D4 ..... N75-12286 #
FOA-2-C-2565-E3-E4-E6 ..... N75-12299 #
FOA-2-C-2567-D4 ..... N75-11895 #
FOA-2-C-2568-E1 ..... N75-12848 #
FOA-2-C-2570-M4 ..... N75-12677 #
FOA-2-C-2571-M4 ..... N75-12676 #
FOA-2-C-2573-E1 ..... N75-12660 #
FOA-2-C-2575-E2 ..... N75-12298 #
FOA-2-C-2576-E4 ..... N75-12241 #
FOA-2-C-2577-E1 ..... N75-12283 #
FOA-2-C-2580-E8 ..... N75-12716 #
FOA-2-C-2581-H5 ..... N75-12586 #
FOA-2-C-2583-E1 ..... N75-12656 #
FOA-2-C-2584-E2 ..... N75-12176 #
FOA-2-C-2585-E1-E3 ..... N75-12889 #
FOA-2-C-2586-E6 ..... N75-12578 #
FOA-2-C-2587-E1 ..... N75-12576 #
FOA-2-C-2589-E5 ..... N75-12658 #
FOA-2-C-2590-E5 ..... N75-12657 #
FOA-2-C-2591-E1-H5 ..... N75-12577 #
FOA-2-C-2592-E6 ..... N75-12333 #
FOA-2-C-2595-H5 ..... N75-12300 #
FOA-2-C-2597-F8 ..... N75-11934 #
FOA-2-C-2606-E1 ..... N75-12471 #
FOA-3-C-3726-E8 ..... N75-12705 #
FOA-3-C-3727-E5 ..... N75-12637 #
FOA-3-C-3728-E2 ..... N75-12704 #
FOA-3-C-3731-E1 ..... N75-12472 #
FOA-3-C-3734-E8 ..... N75-12206 #
FOA-3-C-3738-E8 ..... N75-12175 #
FOA-4-C-4515-A4 ..... N75-12859 #
FOA-4-C-4518-A2 ..... N75-12249 #
FOA-4-C-4519-F3 ..... N75-12126 #
FOA-4-C-4523-A1 ..... N75-12156 #
FOA-4-C-4526-A3 ..... N75-12207 #
FOA-4-C-4530-A1 ..... N75-12095 #
FOA-4-C-4532-D6 ..... N75-12148 #
FOA-4-C-4533-G2 ..... N75-12287 #

FR-109 ..... N75-11907 #
FR-2003-74 ..... N75-12475 #
FR-2653-102 ..... N75-11967 #
FR-6534 ..... N75-11972*#

FSTC-HT-23-1564-73 ..... N75-12426 #

FTAS/TR-74-95 ..... N75-12268 #

FTD-HC-23-1297-74 ..... N75-12376 #
FTD-HC-23-1385-74 ..... N75-12803 #
FTD-HC-23-1802-74 ..... N75-11901 #
FTD-HC-23-1804-74 ..... N75-12266 #
FTD-HC-23-2095-74 ..... N75-12533 #

FTD-HT-23-0002-75 ..... N75-12460 #
FTD-HT-23-1023-74 ..... N75-12626 #
FTD-HT-23-1238-74 ..... N75-12110 #
FTD-HT-23-1240-74 ..... N75-12114 #
FTD-HT-23-1783-74 ..... N75-12820 #
FTD-HT-23-2116-74 ..... N75-12479 #

FTD-MT-24-1005-74 ..... N75-12349 #
FTD-MT-24-1025-74 ..... N75-12584 #
FTD-MT-24-1042-74 ..... N75-12806 #
FTD-MT-24-1086-74 ..... N75-12809 #
FTD-MT-24-1104-74 ..... N75-12380 #
FTD-MT-24-1980-74 ..... N75-12478 #

FTL-A-A16:23-PT-1 ..... N75-12344 #
FTL-A-A28:1 ..... N75-12210 #

G-7506 ..... N75-12144*#
G-7508 ..... N75-12012*#

GE-EE-74-33 ..... N75-12852 #

GE/EE/74-10 ..... N75-12773 #
GE/EE/74-22 ..... N75-12221 #
GE/EE74-27 ..... N75-12627 #

GERHTR-86 ..... N75-12080 #

GFD-74-2 ..... N75-12542 #

GPO-37-171 ..... N75-12431 #
GPO-37-476 ..... N75-12430 #
GPO-41-298 ..... N75-11969 #
GPO-41-665 ..... N75-12416 #
GPO-99-109 ..... N75-12452 #

HDL-TR-1669 ..... N75-12342 #

HI-1884/2-RR ..... N75-12857 #

HPC-72-151 ..... N75-12084 #

HSA-HAD-R-GEN-214-VOL-1 ..... N75-11979 #
HSA-HAD-R-GEN-214-VOL-2 ..... N75-11980 #

HSER-6587 ..... N75-11996 #

IAE-2314 ..... N75-12722 #

ICEC-5 ..... N75-12814 #

IFSM-72-13 ..... N75-12353*#
IFSM-74-61 ..... N75-12374 #

IIT-FLUIDS/HEAT-TRANSFER-R73-7 ..... N75-12295 #

IN-74-EG-20 ..... N75-12025*#

IPP-4/112 ..... N75-12728 #

IR-87-74 ..... N75-11916 #

IS-3396 ..... N75-12680 #
IS-3397 ..... N75-12684 #

ISAS-515-VOL-39-12 ..... N75-12246 #
ISAS-516-VOL-39-13 ..... N75-12678 #
ISAS-517-VOL-39-14 ..... N75-12778 #

ISBN-87-7478-097-2 ..... N75-12539 #

IT-08-74-46 ..... N75-12325 #

ITF-74-21E ..... N75-12800 #
ITF-74-23P ..... N75-12799 #

ITR-3 ..... N75-12451 #

JPL-TM-33-677 ..... N75-12433*#
JPL-TM-33-685 ..... N75-12028*#
JPL-TM-33-695 ..... N75-12171*#
JPL-TM-33-705 ..... N75-12064*#
JPL-TM-33-708 ..... N75-12870*#
JPL-TM-33-709 ..... N75-12734*#
JPL-TM-33-715 ..... N75-12869*#

JPRS-63427 ..... N75-12385 #
JPRS-63441 ..... N75-12468 #
JPRS-63447 ..... N75-12836 #
JPRS-63469 ..... N75-12386 #
JPRS-63487 ..... N75-12829 #
JPRS-63501 ..... N75-12632 #
JPRS-63502 ..... N75-12719 #
JPRS-63543 ..... N75-12384 #
JPRS-63554 ..... N75-12204 #
JPRS-63560 ..... N75-12488 #
JPRS-63569 ..... N75-12507 #
JPRS-63573 ..... N75-12832 #
JPRS-63603 ..... N75-12552 #

JSC-09089 ..... N75-12025*#
JSC-09260 ..... N75-12434*#

K-1860 ..... N75-12134 #

KFK-1934 ..... N75-12532 #
KFK-1966-UF ..... N75-12439 #
KFK-1967 ..... N75-12663 #

L-9325 ..... N75-11931*#
L-9378 ..... N75-11898*#
L-9396 ..... N75-12000*#
L-9446 ..... N75-11893*#
L-9542 ..... N75-11930*#
L-9569 ..... N75-11932*#
L-9585 ..... N75-11933*#
L-9628 ..... N75-12573*#
L-9642 ..... N75-12003*#
L-9652 ..... N75-12244*#
L-9665 ..... N75-11896*#
L-9699 ..... N75-12537*#
L-9731 ..... N75-12063*#
L-9738 ..... N75-12361*
L-9792 ..... N75-12243*#
L-9799 ..... N75-12235*#
L-9816 ..... N75-12234*#
L-9850 ..... N75-12001*#

LA-TR-74-17 ..... N75-12165 #
LA-TR-74-20 ..... N75-12850 #

LA-UR-74-724 ..... N75-12213 #
LA-UR-74-737 ..... N75-12814 #
LA-UR-74-743 ..... N75-12157 #
LA-UR-74-771 ..... N75-12685 #
LA-UR-74-831 ..... N75-12686 #
LA-UR-74-833 ..... N75-12888 #
LA-UR-74-918 ..... N75-12447 #
LA-UR-74-919 ..... N75-12876 #

LA-UR-74-984 ..... N75-12252 #

LA-5364 ..... N75-12877 #
LA-5532-MS ..... N75-12794 #
LA-5564 ..... N75-12104 #
LA-5603-MS ..... N75-12729 #
LA-5605-MS ..... N75-12388 #
LA-5607-MS ..... N75-12307 #

LBL-1172 ..... N75-12132 #
LBL-2585 ..... N75-12766 #
LBL-2592 ..... N75-12767 #
LBL-2598 ..... N75-12133 #
LBL-2676 ..... N75-12661 #
LBL-2712 ..... N75-12765 #

LC-74-600096 ..... N75-12880*#

LCR-73-133/R/G.5 ..... N75-12193

LEC-3805 ..... N75-12025*#

LG74ER0145 ..... N75-11937*#

LMEC-74-6 ..... N75-12100 #

LR-580 ..... N75-12002 #
LR-26195 ..... N75-11982*#

LWL-CR-02E73 ..... N75-12450 #
LWL-CR-03P688 ..... N75-12459 #
LWL-CR-06P72C ..... N75-12339 #

M-134 ..... N75-12529*#
M-464 ..... N75-12875*#

MCR-74-314 ..... N75-12630*#

MERL-TN-73-2 ..... N75-12236 #
MERL-TN-74-1 ..... N75-12355 #

MJO-4409 ..... N75-12082 #

MLM-2103 ..... N75-12444 #

MML-TR-74-23C ..... N75-12142 #

MONO-65 ..... N75-12482
MONO-92 ..... N75-12483
MONO-93-VOL-1 ..... N75-12485
MONO-93-VOL-2 ..... N75-12484
MONO-93-VOL-3 ..... N75-12486

MPI-PAE/EXTRATERR-96 ..... N75-12774

MPR-10 ..... N75-12414*#

MR-15 ..... N75-12019*#

MSC-2243 ..... N75-12137 #

MTR-2808 ..... N75-12004 #
MTR-6419-REV-1 ..... N75-11919 #
MTR-6419-SER-3 ..... N75-11928 #
MTR-6419-SER-4-VOL-1 ..... N75-11926 #
MTR-6419-SER-4-VOL-2 ..... N75-11927 #
MTR-6419-SER-5 ..... N75-11925 #
MTR-6419-SER-6 ..... N75-11917 #
MTR-6419-SER-7 ..... N75-11923 #
MTR-6419-SER-8 ..... N75-11924 #

NADC-73227-81 ..... N75-12383 #
NADC-74049-30 ..... N75-11968 #

NAEC-GSED-78 ..... N75-11986 #

NAMRL-1208 ..... N75-12574*#

NASA-CASE-ARC-10448-2 ..... N75-12732*
NASA-CASE-ARC-10469-1 ..... N75-12086*
NASA-CASE-ARC-10643-1 ..... N75-12087*
NASA-CASE-ARC-10760-1 ..... N75-12275*#

NASA-CASE-GSC-11619-1 ..... N75-12222*

NASA-CASE-KSC-10750-1 ..... N75-12270*

NASA-CASE-LAR-11059-1 ..... N75-12810*
NASA-CASE-LAR-11069-1 ..... N75-12272*

NASA-CASE-LAR-11211-1 ..... N75-12326*
NASA-CASE-LAR-11575-1 ..... N75-12195*#

NASA-CASE-MFS-20506-1 ..... N75-12273*
NASA-CASE-MFS-20775-1 ..... N75-12161*
NASA-CASE-MFS-20994-1 ..... N75-12271*
NASA-CASE-MFS-21611-1 ..... N75-12616*
NASA-CASE-MFS-23009-1 ..... N75-12328*#

NASA-CASE-NPO-13422-1 ..... N75-12652*#
NASA-CASE-NPO-13497-1 ..... N75-12429*#
NASA-CASE-NPO-13528-1 ..... N75-11997*#
NASA-CASE-NPO-13540-1 ..... N75-12276*#

NASA-CR-2377 ..... N75-11982*#
NASA-CR-2469 ..... N75-12248*#
NASA-CR-2472 ..... N75-11983*#
NASA-CR-2475 ..... N75-12422*#
NASA-CR-2477 ..... N75-12529*#
NASA-CR-2486 ..... N75-11910*#
NASA-CR-120492 ..... N75-12198*#
NASA-CR-120496 ..... N75-12531*#
NASA-CR-120518 ..... N75-12015*#
NASA-CR-120531 ..... N75-12011*#
NASA-CR-120534 ..... N75-12669*#
NASA-CR-120536 ..... N75-12208*#
NASA-CR-120539 ..... N75-12437*#
NASA-CR-120540 ..... N75-12546*#
NASA-CR-120586 ..... N75-11985*#
NASA-CR-129034 ..... N75-12017*#
NASA-CR-129036 ..... N75-12016*#
NASA-CR-132455 ..... N75-11937*#
NASA-CR-132509 ..... N75-12168*#
NASA-CR-132510 ..... N75-12169*#
NASA-CR-132511 ..... N75-12170*#
NASA-CR-132537 ..... N75-12585*#
NASA-CR-132548 ..... N75-12364*#
NASA-CR-134288 ..... N75-12419*#
NASA-CR-134289 ..... N75-12279*#
NASA-CR-134294 ..... N75-12420*#
NASA-CR-134401 ..... N75-12029*#
NASA-CR-134411 ..... N75-12033*#
NASA-CR-134414 ..... N75-12040*#
NASA-CR-134416 ..... N75-12034*#
NASA-CR-134421 ..... N75-12035*#
NASA-CR-134425 ..... N75-12032*#
NASA-CR-134427 ..... N75-12030*#
NASA-CR-134430 ..... N75-12031*#
NASA-CR-134435 ..... N75-12022*#
NASA-CR-134617 ..... N75-11984*#
NASA-CR-134639 ..... N75-11972*#
NASA-CR-134656 ..... N75-12058*#
NASA-CR-134657 ..... N75-12059*#
NASA-CR-134666 ..... N75-11929*#
NASA-CR-134688 ..... N75-12120*#
NASA-CR-134712 ..... N75-12077*#
NASA-CR-137578 ..... N75-11935*#
NASA-CR-137579 ..... N75-11936*#
NASA-CR-137587 ..... N75-12878*#
NASA-CR-139156 ..... N75-12020*#
NASA-CR-139157 ..... N75-12177*#
NASA-CR-139158 ..... N75-12026*#
NASA-CR-139802 ..... N75-12544*#
NASA-CR-140322 ..... N75-12842*#
NASA-CR-140330 ..... N75-12580*#
NASA-CR-140331 ..... N75-12199*#
NASA-CR-140332 ..... N75-12631*#
NASA-CR-140334 ..... N75-12418*#
NASA-CR-140335 ..... N75-11999*#
NASA-CR-140340 ..... N75-12345*#
NASA-CR-140341 ..... N75-12038*#
NASA-CR-140347 ..... N75-12618*#
NASA-CR-140348 ..... N75-12675*#
NASA-CR-140349 ..... N75-12025*#
NASA-CR-140357 ..... N75-12417*#
NASA-CR-140358 ..... N75-12069*#
NASA-CR-140362 ..... N75-12278*#
NASA-CR-140363 ..... N75-12630*#
NASA-CR-140364 ..... N75-12036*#
NASA-CR-140365 ..... N75-12574*#
NASA-CR-140371 ..... N75-12871*#
NASA-CR-140650 ..... N75-12395*#
NASA-CR-140654 ..... N75-12394*#
NASA-CR-140656 ..... N75-12393*#
NASA-CR-140658 ..... N75-12392*#
NASA-CR-140688 ..... N75-12390*#
NASA-CR-140728 ..... N75-12391*#
NASA-CR-140731 ..... N75-12396*#
NASA-CR-140732 ..... N75-12397*#
NASA-CR-140733 ..... N75-12398*#
NASA-CR-140734 ..... N75-12399*#
NASA-CR-140735 ..... N75-12400*#
NASA-CR-140741 ..... N75-12401*#
NASA-CR-140762 ..... N75-12402*#
NASA-CR-140763 ..... N75-12403*#
NASA-CR-140771 ..... N75-12404*#
NASA-CR-140772 ..... N75-12405*#
NASA-CR-140773 ..... N75-12406*#
NASA-CR-140775 ..... N75-12407*#
NASA-CR-140776 ..... N75-12408*#
NASA-CR-140777 ..... N75-12409*#
NASA-CR-140778 ..... N75-12410*#
NASA-CR-140779 ..... N75-12411*#
NASA-CR-140780 ..... N75-12412*#
NASA-CR-140782 ..... N75-12413*#
NASA-CR-140783 ..... N75-12414*#
NASA-CR-140784 ..... N75-12415*#
NASA-CR-140800 ..... N75-12060*#
NASA-CR-140801 ..... N75-12858*#
NASA-CR-140802 ..... N75-12812*#
NASA-CR-140803 ..... N75-12354*#
NASA-CR-140827 ..... N75-11911*#
NASA-CR-140828 ..... N75-12734*#
NASA-CR-140841 ..... N75-12870*#
NASA-CR-140842 ..... N75-12064*#
NASA-CR-140843 ..... N75-12433*#
NASA-CR-140844 ..... N75-12617*#
NASA-CR-140845 ..... N75-12869*#
NASA-CR-140846 ..... N75-12353*#
NASA-CR-140847 ..... N75-12228*#
NASA-CR-140848 ..... N75-12229*#
NASA-CR-140849 ..... N75-12230*#
NASA-CR-140850 ..... N75-12209*#
NASA-CR-140851 ..... N75-12028*#
NASA-CR-140852 ..... N75-12171*#
NASA-CR-140853 ..... N75-11912*#
NASA-CR-140854 ..... N75-12201*#
NASA-CR-140856 ..... N75-12882*#
NASA-CR-140857 ..... N75-12464*#
NASA-CR-140858 ..... N75-12867*#
NASA-CR-140859 ..... N75-12861*#
NASA-CR-140860 ..... N75-11974*#
NASA-CR-140861 ..... N75-12088*#
NASA-CR-140864 ..... N75-12872*#
NASA-CR-140865 ..... N75-12421*#
NASA-CR-140937 ..... N75-12359*
NASA-CR-140938 ..... N75-12621*#
NASA-CR-140941 ..... N75-12622*#
NASA-CR-140942 ..... N75-12694*#
NASA-CR-140955 ..... N75-12865*#
NASA-CR-140956 ..... N75-12116*#
NASA-CR-140957 ..... N75-12115*#
NASA-CR-140958 ..... N75-12254*#
NASA-CR-140960 ..... N75-12473*#
NASA-CR-140971 ..... N75-11987*#
NASA-CR-140996 ..... N75-12775*#
NASA-CR-140997 ..... N75-12572*#
NASA-CR-140998 ..... N75-12674*#
NASA-CR-141044 ..... N75-12424*#
NASA-CR-141045 ..... N75-12425*#
NASA-CR-141046 ..... N75-12423*#

NASA-EP-118 ..... N75-12885*#

NASA-SP-348 ..... N75-12880*#
NASA-SP-5972(01) ..... N75-12200*#
NASA-SP-5976(01) ..... N75-12343*#
NASA-SP-5978(02) ..... N75-12162*#

NASA-TM-X-3079 ..... N75-11896*#
NASA-TM-X-3089 ..... N75-12573*#
NASA-TM-X-3115 ..... N75-11898*#
NASA-TM-X-3133 ..... N75-11970*#
NASA-TM-X-3136 ..... N75-12329*#
NASA-TM-X-3144 ..... N75-11971*#
NASA-TM-X-3145 ..... N75-12128*#
NASA-TM-X-3154 ..... N75-12070*#
NASA-TM-X-3156 ..... N75-12334*#
NASA-TM-X-58157 ..... N75-12434*#
NASA-TM-X-62397 ..... N75-12735*+
NASA-TM-X-62402 ..... N75-12277*#
NASA-TM-X-64889 ..... N75-12037*#
NASA-TM-X-64890 ..... N75-12061*#
NASA-TM-X-64891 ..... N75-12462*#
NASA-TM-X-64894 ..... N75-12296*#
NASA-TM-X-64895 ..... N75-12014*#
NASA-TM-X-64896 ..... N75-12018*#
NASA-TM-X-65944 ..... N75-12039*#

NASA-TM-X-70394 ..... N75-12019*#
NASA-TM-X-70578 ..... N75-12863*#
NASA-TM-X-7C733 ..... N75-12884*#
NASA-TM-X-70786 ..... N75-12469*#
NASA-TM-X-70789 ..... N75-12887*#
NASA-TM-X-7C791 ..... N75-12862*#
NASA-TM-X-70792 ..... N75-12873*#
NASA-TM-X-70793 ..... N75-12874*#
NASA-TM-X-71971 ..... N75-11973*#
NASA-TM-X-71990 ..... N75-12883*#
NASA-TM-X-72112 ..... N75-12604*#
NASA-TM-X-72624 ..... N75-12233*#
NASA-TM-X-72629 ..... N75-12172*#

NASA-TN-D-7663 ..... N75-12690*#
NASA-TN-D-7694 ..... N75-11931*#
NASA-TN-D-7713 ..... N75-11930*#
NASA-TN-D-7726 ..... N75-12012*#
NASA-TN-D-7728 ..... N75-12244*#
NASA-TN-D-7742 ..... N75-11932*#
NASA-TN-D-7747 ..... N75-12003*#
NASA-TN-D-7753 ..... N75-11893*#
NASA-TN-D-7762 ..... N75-12000*#
NASA-TN-D-7771 ..... N75-12537*#
NASA-TN-D-7777 ..... N75-11933*#
NASA-TN-D-7792 ..... N75-12063*#
NASA-TN-D-7810 ..... N75-12234*#
NASA-TN-D-7811 ..... N75-12001*#
NASA-TN-D-7812 ..... N75-12235*#
NASA-TN-D-7824 ..... N75-12245*#
NASA-TN-D-7826 ..... N75-11978*#
NASA-TN-D-7835 ..... N75-12243*#
NASA-TN-D-7837 ..... N75-12330*#
NASA-TN-D-7840 ..... N75-12124*#
NASA-TN-D-7844 ..... N75-12144*#
NASA-TN-D-7847 ..... N75-12127*#
NASA-TN-D-7854 ..... N75-12875*#

NASA-TR-72-1 ..... N75-12353*#

NASA-TT-F-14795 ..... N75-12013*#
NASA-TT-F-16004 ..... N75-11892*#
NASA-TT-F-16021 ..... N75-12463*#
NASA-TT-F-16043 ..... N75-12117*#

NBS-SP-399-VOL-2 ..... N75-12628 #
NBS-SP-399-VOL-3 ..... N75-12629 #

NBSIR-74-359 ..... N75-12138 #

NELC-TR-1924 ..... N75-12772 #

NISC-TRANS-3583 ..... N75-11920 #

NOLTR-73-154 ..... N75-12085 #
NOLTR-74-121 ..... N75-12255 #

NP-20009 ..... N75-12792 #
NP-20054 ..... N75-12720 #

NPS-55ZA74031 ..... N75-12709 #
NPS-57CO-74061 ..... N75-12312 #

NRC-14354 ..... N75-12002 #

NRL-MR-2846 ..... N75-12315 #
NRL-MR-2847 ..... N75-12318 #
NRL-MR-2858 ..... N75-12109 #
NRL-MR-2859 ..... N75-12802 #
NRL-MR-2869 ..... N75-12190 #
NRL-MR-2872 ..... N75-12150 #
NRL-MR-2879 ..... N75-12136 #

NRL-7701 ..... N75-12141 #
NRL-7728 ..... N75-12314 #
NRL-7771 ..... N75-12711 #
NRL-7779 ..... N75-12215 #
NRL-7780 ..... N75-12135 #
NRL-7792-PT-1 ..... N75-12715 #

NSRDC-4407 ..... N75-12340 #
NSRDC-4456 ..... N75-11954 #

NUC-TP-413 ..... N75-12185 #

NWC-TP-5618-PT-1 ..... N75-12158 #
NWC-TP-5618-PT-2 ..... N75-12159 #

ORNL-TM-4206 ..... N75-12369 #
ORNL-TM-4269 ..... N75-12366 #
ORNL-TM-4515 ..... N75-12721 #
ORNL-TM-4564 ..... N75-12886 #
ORNL-TM-4605 ..... N75-12815 #
ORNL-TM-4606 ..... N75-12727 #

ORNL-4978 ..... N75-12730 #

ORO-4348-1 ..... N75-12731 #

PAPER-73-341 ..... N75-12359*

PRRL-74-CR-64 ..... N75-12437*#

PT-1972:5 ..... N75-12538 #
PT-1972:7 ..... N75-12387 #

PUBL-74-4 ..... N75-12205 #
PUBL-74-6 ..... N75-12242 #

PWA-FR-6094 ..... N75-11987*#

PWA-TM-5022 ..... N75-12077*#

P74-289 ..... N75-12208*#

QPR-4 ..... N75-12407*#
QPR-6 ..... N75-12391*#
QPR-6 ..... N75-12400*#
QPR-6 ..... N75-12406*#

QTR-6 ..... N75-12665 #
QTR-15 ..... N75-12437*#
QTR-72-1039 ..... N75-12618*#

R-628 ..... N75-12216 #
R-651 ..... N75-12214 #
R-653 ..... N75-12666 #
R-713 ..... N75-12345*#
R-721 ..... N75-12038*#
R-1259 ..... N75-11903 #
R-1448-ARPA ..... N75-12449 #
R-1523-PR ..... N75-12771 #
R-4958 ..... N75-12177*#

RADC-TR-74-1 ..... N75-12323 #
RADC-TR-74-150 ..... N75-12188 #
RADC-TR-74-177 ..... N75-12191 #
RADC-TR-74-181 ..... N75-12293 #

RAE-LIB-TRANS-1713 ..... N75-11977 #
RAE-LIB-TRANS-1734 ..... N75-12224 #
RAE-LIB-TRANS-1736 ..... N75-11998 #
RAE-LIB-TRANS-1756 ..... N75-11913 #
RAE-LIB-TRANS-1757 ..... N75-12067 #
RAE-LIB-TRANS-1773 ..... N75-12062 #
RAE-LIB-TRANS-1774 ..... N75-12196 #
RAE-LIB-TRANS-1775 ..... N75-12027 #
RAE-LIB-TRANS-1777 ..... N75-12575 #
RAE-LIB-TRANS-1778 ..... N75-12579 #
RAE-LIB-TRANS-1782 ..... N75-12211 #
RAE-LIB-TRANS-1790 ..... N75-12123 #
RAE-LIB-TRANS-1793 ..... N75-12365 #
RAE-LIB-TRANS-1797 ..... N75-12125 #

RASA-74-01 ..... N75-12261 #
RASA-74-02 ..... N75-11993 #

RD-73-23-VOL-1 ..... N75-11904 #
RD-73-23-VOL-2 ..... N75-11905 #

RD/B/N-2784 ..... N75-12368 #

RE-587 ..... N75-12377 #

REC-ERC-73-17 ..... N75-12487 #

REPT-9-14103-F ..... N75-12631*#
REPT-13 ..... N75-12674*#
REPT-58 ..... N75-12640 #
REPT-71-6 ..... N75-12224 #
REPT-72-6 ..... N75-12372 #
REPT-74-8 ..... N75-12410*#
REPT-74-42 ..... N75-12227 #
REPT-74-2001-5 ..... N75-12423*#
REPT-74-2001-6 ..... N75-12424*#
REPT-74-2001-7 ..... N75-12425*#
REPT-594 ..... N75-12153 #
REPT-673-PTR ..... N75-12188 #

REPT-1230/73-143 ..... N75-12192
REPT-8562 ..... N75-12194
REPT-70208-10 ..... N75-12258 #

RISO-301 ..... N75-12796 #

RLO-2225-T-15-19 ..... N75-12074 #

RM-590 ..... N75-12139 #

S-REPT-93-598 ..... N75-12452 #

SAI-R73-011-1-VOL-1 ..... N75-11961 #
SAI-R73-011-2-VOL-2 ..... N75-11962 #

SAM-TR-74-43 ..... N75-12583 #

SAMSO-TR-74-70-VOL-2 ..... N75-12481 #
SAMSO-TR-74-155 ..... N75-12648 #
SAMSO-TR-74-180 ..... N75-12267 #
SAMSO-TR-74-196 ..... N75-12322 #

SAND-74-0130 ..... N75-12878*#
SAND-74-5006 ..... N75-12311 #
SAND-74-5018 ..... N75-12644 #
SAND-74-5023 ..... N75-12253 #

SAO-3 ..... N75-12891 #

SAR-4 ..... N75-12319 #
SAR-634W ..... N75-12775*#

SATR-4 ..... N75-12536 #

SGD-4224-0801 ..... N75-12320 #

SIO-REF-74-28 ..... N75-12540 #

SLA-73-1075 ..... N75-12335 #
SLA-73-7064 ..... N75-12304 #
SLA-74-30 ..... N75-12179 #
SLA-74-46 ..... N75-12446 #
SLA-74-97 ..... N75-12292 #
SLA-74-204 ..... N75-12336 #
SLA-74-218 ..... N75-12645 #
SLA-74-242 ..... N75-12647 #
SLA-74-277 ..... N75-12370 #
SLA-74-5034 ..... N75-12795 #
SLA-74-5148 ..... N75-12717 #
SLA-74-5319 ..... N75-12681 #
SLA-74-5322 ..... N75-12101 #
SLA-74-5431 ..... N75-12181 #
SLA-74-5438 ..... N75-12682 #

SLL-73-63 ..... N75-12367 #
SLL-74-5 ..... N75-12642 #
SLL-74-200 ..... N75-12683 #
SLL-74-218 ..... N75-12817 #
SLL-74-5001 ..... N75-12164 #
SLL-74-5244 ..... N75-12105 #

SLSR-2-74B ..... N75-11914 #
SLSR-6-74B ..... N75-12844 #
SLSR-01-74B ..... N75-11995 #
SLSR-28-74B ..... N75-12854 #

SQUID-TR-MICH-13-PU ..... N75-12257 #

SQUID-TR-YALE-6-PU ..... N75-12263 #

SR-3 ..... N75-12819 #

SRI-MP74-31 ..... N75-12718 #

SRO-810-1 ..... N75-12547 #

SSL-SER-15-ISSUE-31 ..... N75-12871*#

SU-IPR-596 ..... N75-12867*#
SU-IPR-597 ..... N75-12882*#

SU-SOL-74-10 ..... N75-12651 #

SUDAM-74-5 ..... N75-12379 #

TID-26534 ..... N75-12442 #
TID-26599 ..... N75-12692 #
TID-26601 ..... N75-12670 #
TID-26602 ..... N75-12664 #

TID-26613 ..... N75-12581 #

TM-9 ..... N75-11912*#
TM-12 ..... N75-11911*#
TM-16 ..... N75-12209*#
TM-74-224 ..... N75-11991 #

TM-336 ..... N75-12091 #
TM-341 ..... N75-12122 #
TM-352 ..... N75-12706 #
TM-1974-23 ..... N75-12024 #
TM-1974-32 ..... N75-12183 #
TM-1974-35 ..... N75-12189 #
TM-1974-44 ..... N75-12688 #

TR-CS-3 ..... N75-12713 #

TR-EE-74-110 ..... N75-12278*#

TR-1 ..... N75-12228*#
TR-1 ..... N75-12353*#
TR-2 ..... N75-12229*#
TR-2 ..... N75-12374 #
TR-3 ..... N75-12230*#
TR-6 ..... N75-12843 #
TR-7 ..... N75-12615 #
TR-10 ..... N75-12137 #
TR-38 ..... N75-12083 #
TR-46 ..... N75-12613 #
TR-239-17 ..... N75-12405*#
TR-653 ..... N75-12219 #
TR-0074(4127-01)-1 ..... N75-12267 #
TR-0074(9260-06)-1-VOL-2 ..... N75-12481 #
TR-0075(5240-10)-2 ..... N75-12322 #
TR-2902-20 ..... N75-12201*#

TRW-25475-6006-TU-00 ..... N75-12648 #

TSC-W6-31 ..... N75-12770 #

TWP-72-004 ..... N75-12279*#

UARL-N921681-9 ..... N75-12313 #

UCID-16525 ..... N75-12310 #
UCID-16527 ..... N75-12725 #

UCLA-10-P-14-126 ..... N75-12347 #
UCLA-10-P-14-128 ..... N75-12643 #

UCRL-13597 ..... N75-12308 #
UCRL-51529 ..... N75-12251 #
UCRL-51568 ..... N75-12726 #
UCRL-51582 ..... N75-12662 #
UCRL-51587 ..... N75-12625 #
UCRL-74926 ..... N75-12302 #
UCRL-75367 ..... N75-12303 #
UCRL-75655 ..... N75-12646 #
UCRL-75691 ..... N75-12309 #

UILU-ENG-73-2230 ..... N75-12216 #
UILU-ENG-74-2059 ..... N75-12666 #
UILU-ENG-74-2217 ..... N75-12214 #

UNICP-PR74 ..... N75-12808 #

US-PATENT-APPL-SN-281908 ..... N75-12086*
US-PATENT-APPL-SN-302681 ..... N75-12326*
US-PATENT-APPL-SN-326198 ..... N75-12272*
US-PATENT-APPL-SN-328792 ..... N75-12273*
US-PATENT-APPL-SN-346372 ..... N75-12270*
US-PATENT-APPL-SN-356664 ..... N75-12161*
US-PATENT-APPL-SN-367294 ..... N75-12810*
US-PATENT-APPL-SN-374424 ..... N75-12732*
US-PATENT-APPL-SN-386789 ..... N75-12271*
US-PATENT-APPL-SN-397476 ..... N75-12222*
US-PATENT-APPL-SN-403694 ..... N75-12616*
US-PATENT-APPL-SN-513389 ..... N75-12087*
US-PATENT-APPL-SN-521601 ..... N75-12652*#
US-PATENT-APPL-SN-521620 ..... N75-11997*#
US-PATENT-APPL-SN-522557 ..... N75-12328*#
US-PATENT-APPL-SN-526438 ..... N75-12275*#
US-PATENT-APPL-SN-526448 ..... N75-12429*#
US-PATENT-APPL-SN-526450 ..... N75-12276*#
US-PATENT-APPL-SN-527727 ..... N75-12195*#

US-PATENT-CLASS-29-470.1 ..... N75-12326*
US-PATENT-CLASS-29-475 ..... N75-12326*
US-PATENT-CLASS-33-DIG.13 ..... N75-12273*

US-PATENT-CLASS-33-180R N75-12273*
US-PATENT-CLASS-73-32R N75-12810*
US-PATENT-CLASS-73-67.1 ..... N75-12271*
US-PATENT-CLASS-73-432PS N75-12810*
US-PATENT-CLASS-117-93.1GD N75-12087*
US-PATENT-CLASS-117-161UA N75-12087*
US-PATENT-CLASS-117-161UN N75-12087*
US-PATENT-CLASS-117-161UZ N75-12087*
US-PATENT-CLASS-118-49.1 ..... N75-12161*
US-PATENT-CLASS-128-2V N75-12271*
US-PATENT-CLASS-138-113 ..... N75-12222*
US-PATENT-CLASS-138-114 ..... N75-12222*
US-PATENT-CLASS-138-148 ..... N75-12222*
US-PATENT-CLASS-156-7 ..... N75-12732*
US-PATENT-CLASS-156-16 ..... N75-12732*
US-PATENT-CLASS-156-18 ..... N75-12732*
US-PATENT-CLASS-165-1 ..... N75-12222*
US-PATENT-CLASS-165-47 ..... N75-12222*
US-PATENT-CLASS-165-105 ..... N75-12222*
US-PATENT-CLASS-195-103.5E N75-12086*
US-PATENT-CLASS-195-127 ..... N75-12272*
US-PATENT-CLASS-204-177 ..... N75-12087*
US-PATENT-CLASS-210-500 ..... N75-12087*
US-PATENT-CLASS-214-1CM N75-12616*
US-PATENT-CLASS-220-15 ..... N75-12222*
US-PATENT-CLASS-244-1SC N75-12222*
US-PATENT-CLASS-250-495 ..... N75-12732*
US-PATENT-CLASS-264-22 ..... N75-12087*
US-PATENT-CLASS-264-217 ..... N75-12087*
US-PATENT-CLASS-307-149 ..... N75-12616*
US-PATENT-CLASS-308-174 ..... N75-12616*
US-PATENT-CLASS-324-60C N75-12270*
US-PATENT-CLASS-324-158T N75-12270*
US-PATENT-CLASS-350-292 ..... N75-12273*

US-PATENT-3,841,973 ..... N75-12272*
US-PATENT-3,842,485 ..... N75-12326*
US-PATENT-3,842,509 ..... N75-12273*
US-PATENT-3,842,656 ..... N75-12810*
US-PATENT-3,846,243 ..... N75-12086*
US-PATENT-3,847,115 ..... N75-12161*
US-PATENT-3,847,141 ..... N75-12271*
US-PATENT-3,847,208 ..... N75-12222*
US-PATENT-3,847,652 ..... N75-12087*
US-PATENT-3,847,689 ..... N75-12732*
US-PATENT-3,848,190 ..... N75-12270*
US-PATENT-3,849,668 ..... N75-12616*

USA-NLABS-TR-74-37-PL ..... N75-12621*#

USAAMRDL-TR-73-97A-VOL-1 ..... N75-11961 #
USAAMRDL-TR-73-97B-VOL-2 ..... N75-11962 #
USAAMRDL-TR-74-27 ..... N75-12338 #
USAAMRDL-TR-74-37 ..... N75-11993 #
USAAMRDL-TR-74-53 ..... N75-11994 #
USAAMRDL-TR-74-56 ..... N75-11903 #
USAAMRDL-TR-74-59 ..... N75-12082 #

USAASTA-74-10 ..... N75-11964 #

USAAVSCOM-TR-74-39 ..... N75-11906 #

USAFETAC-TN-74-1 ..... N75-12476 #

USAMC-ITC-02-08-73-008 ..... N75-12691 #
USAMC-ITC-02-08-73-029 ..... N75-11963 #
USAMC-ITC-02-08-73-101 ..... N75-12351 #

USAMERDC-2101 ..... N75-12220 #

USNA-TSPR-54 ..... N75-12337 #

UTC-2410-FR-VOL-1 ..... N75-12071 #

UTIAS-REVIEW-38 ..... N75-12804 #

VKI-TN-96-PT-2 ..... N75-12269 #

VP-X-129 ..... N75-12436 #

VPI-AERO-015 ..... N75-12248*#
VPI-AERO-026 ..... N75-12254*#

WANL-M-FR-74-003 ..... N75-12143 #

WASH-1139-74 ..... N75-12723 #
WASH-1290 ..... N75-12797 #
WASH-1310 ..... N75-12445 #
WASH-1311 ..... N75-12724 #

WHOI-74-27 ..... N75-12543 #

WRE-TN-1246(WR-D) ..... N75-12466 #

WTHD-63 ..... N75-12238 #

WVT-TR-74012 ..... N75-12823 #
WVT-TR-74031 ..... N75-12149 #

X-626-74-326 ..... N75-12873*#
X-661-74-3 ..... N75-12862*#
X-661-74-11 ..... N75-12863*#
X-692-74-329 ..... N75-12874*#
X-693-74-234 ..... N75-12884*#
X-693-74-316 ..... N75-12887*#
X-732-72-196 ..... N75-12039*#
X-912-74-291 ..... N75-12469*#

Y-DA-5786 ..... N75-12305 #

PUBLIC COLLECTIONS OF NASA DOCUMENTS

DOMESTIC

NASA distributes its technical documents and bibliographic tools to ten special libraries located in the organizations listed below. Each library is prepared to furnish the public such services as reference assistance, interlibrary loans, photocopy service, and assistance in obtaining copies of NASA documents for retention.

CALIFORNIA
University of California, Berkeley
COLORADO
University of Colorado, Boulder
DISTRICT OF COLUMBIA
Library of Congress
GEORGIA
Georgia Institute of Technology, Atlanta
ILLINOIS
The John Crerar Library, Chicago
MASSACHUSETTS
Massachusetts Institute of Technology, Cambridge
MISSOURI
Linda Hall Library, Kansas City
NEW YORK
Columbia University, New York
PENNSYLVANIA
Carnegie Library of Pittsburgh
WASHINGTON
University of Washington, Seattle

NASA publications (those indicated by an "*" following the accession number) are also received by the following public and free libraries:

CALIFORNIA
Los Angeles Public Library
San Diego Public Library
COLORADO
Denver Public Library
CONNECTICUT
Hartford Public Library
MARYLAND
Enoch Pratt Free Library, Baltimore
MASSACHUSETTS
Boston Public Library
MICHIGAN
Detroit Public Library
MINNESOTA
Minneapolis Public Library
MISSOURI
Kansas City Public Library
St. Louis Public Library
NEW JERSEY
Trenton Public Library
NEW YORK
Brooklyn Public Library
Buffalo and Erie County Public Library
Rochester Public Library
New York Public Library
OHIO
Akron Public Library
Cincinnati Public Library
Cleveland Public Library
Dayton Public Library
Toledo Public Library
OKLAHOMA
Oklahoma County Libraries, Oklahoma City
TENNESSEE
Memphis Public Library
TEXAS
Dallas Public Library
Fort Worth Public Library
WASHINGTON
Seattle Public Library
WISCONSIN
Milwaukee Public Library

An extensive collection of NASA and NASA-sponsored documents and aerospace publications available to the public for reference purposes is maintained by the American Institute of Aeronautics and Astronautics, Technical Information Service, 750 Third Avenue, New York, New York, 10017.

EUROPEAN

An extensive collection of NASA and NASA-sponsored publications is maintained by the British Library Lending Division, Boston Spa, Wetherby, Yorkshire, England. By virtue of arrangements other than with NASA, the British Library Lending Division also has available many of the non-NASA publications cited in *STAR*. European requesters may purchase facsimile copy of microfiche of NASA and NASA-sponsored documents, those identified by both the symbols "#" and "*", from: ESRO/ELDO Space Documentation Service, European Space Research Organization, 114, av. Charles de Gaulle, 92-Neuilly-sur-Seine, France.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. 20546

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE $300

SPECIAL FOURTH CLASS MAIL
Book

POSTAGE AND FEES PAID
NATIONAL AERONAUTICS AND
SPACE ADMINISTRATION
NASA-451

POSTMASTER : If Undeliverable (Section
Postal Manual) Do Not